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VOLUME 11

IN THE SUPERIOR COURT,

State of California, County of Sacramento.

OCTOBER SESSION, 1881.

HON. JACKSON TEMPLE, - - - - - - PRESIDING JUDGE.

WINFIELD J. DAVIS, OFFICIAL REPORTER.

SAMUEL OSBOURNE AND WILLIAM M. CUTTER, REPORTERS.

The People of the State of California,
vs.
The Gold Run Ditch and Mining Co.

COUNSEL:

For Plaintiff,

HON. A. L. HART, Attorney General, GEORGE CADWALADER, ISAAC S. BELCHER, A. L. RHODES, RICHARD BAYNE.

For Defendant,

J. K. BYRNE, W. C. BELCHER, S. M. WILSON, W. T. WALLACE, A. B. DIBBLE, A. P. CATLIN.

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In the Superior Court
Of the State of California
in and for the County of
Sacramento

The People of the State
of California
vs.
The Gold Run Ditch
and Mining Company

Morning Session
Friday
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Winfield J. Davis
Official Reporter

In the Superior Court of the State of California in and for the County of Sacramento

The People of the State of California vs. The Gold Run Ditch and Mining Company } Morning Session Friday December 2nd/81

Testimony of C. E. Grunsky resumed

Mr. Hart. You stated yesterday that you had made some soundings. Where did you make those soundings? A. Soundings were made by me in the Sacramento River from Mike Brytes place to the foot of O. street and also in the mouth of the American River

Q. At what time in the year

3158 did you make those soundings?

A. They were made in April 1880

Q. What did you learn at that time in reference to the bed of the river and the sand in the river? A. I found that the river bed did not in all its points Coincide with the Examinations made previously. The Elevation of the bottom as determined by soundings that had been made at times gone before or as shown by data which was in the State Engineer office. In the American River I found that the bed was apparently level or even that the general depth of the water from side to side was about Eleven feet. The water guage at the foot of K. Street read at the time of my soundings about 23 feet.

Q. 23 feet above low water mark? A. Above the low water mark of 1849 as I understand the guage has
3159 been so placed that its zero

point coincides with that low water plane

Q. What was the depth of water, the general depth of water in the Sacramento river if you remember? A. It ranged from nothing near the sides to about 38 feet. I think that is the greatest depth of water that I found at any place

Q. Where did you find that depth? A. I remember one instance at a bend near Mike Brytes place where the water was very deep.

The Court. Where is that place?

A. It several miles above the American river on the Sacramento river

Q. Now what were the results of your soundings below the mouth of the American and in the Sacramento River, what depth did you find the water?

A. The depth of water near the right bank of the Sacramento river opposite and below the mouth of the American river was greater than it was near the left bank. There was evidence of some deposit near the left bank, or the deposit of a bar was there indicated which would be above the low water plane,

Q. What was the greatest depth there if you can remember

A. I do not remember

Q. Well, below the bridge

A. The greatest depth of water was near the left bank, the least water was near the right bank

Q. Do you remember what the depth of water was?

A. I do not, that is not exactly

Q. At the deep places did you see any difference between the depth of water then and the depth of the river in 1849 as indicated by the guage?

A. Yes sir, from my sounding work at that time I concluded that the river bed was higher by about fifteen feet on an average from side to side than it was when the soundings made by Watson and shown on the old City map had been made

Cross-Examination of

C. E. Grunsky

Mr. W. C. Belcher How old are you Mr. Grunsky?

A. I am 26 years old, born on the 4th of April 1855

Q. Your education you say was in part at Stockton? A Yes.

Q. And in part at Stuttgart?

A. Yes sir

Q. How long were you there?

A. I was in Stuttgart five years or more.

Q. How long in the school there?

A During all that time

Q. And in the same school?

A. No sir; for the first two years in a preparatory school

Q. And during the last three?

A. In the Polytechnic Institute

Q. You say you entered upon

the practical duties of your profession in 1877?

A. I returned to California in 1877 and was ready for practice and did some practical work between that time and the time at which I was employed by the State Engineer.

Q. Where? A. In Stockton

Q. Surveying in the field?

A. No sir; I simply had occasion to make several calculations and tracings and little maps as an Engineer is apt to find to do

Q. You have spoken of this filling here of the river — that was your last testimony this morning. You made some soundings across the river taking a section across where — below the bridge?

A. I took sections at various points, distant from each other three or four hundred feet from the bridge down to about O. Street

Q. Where was the first below the bridge? A. It was 3163 about three hundred feet below the bridge as I now remember

Q. About three hundred feet below the bridge? A. Yes sir

Q. Then at distances of about three or four hundred feet, at what time did you make this examination?

A. This examination was made in April 1880

Q. What assistance did you have

A. I had a gentleman in the boat noting time, and calling out the depths of water, another one heaving lead, I had an Engineer and a pilot and the work was done from a steam launch belonging to the State Engineer department

Q. You have the figures have you of your examination here at this time, of the river? A. Yes sir

Q. So that you can give the figures accurately as to the depth which you found at different places? A. Yes sir

Q. And how you made your estimate of an average fill?

3164 A. I have not all those data here

Q. I did not ask you if you had it here, but I asked you if you had it? A. I am not able to state now whether all those soundings were plated, I simply examined them with reference to other soundings taken before, the result of a comparison between which, and the old soundings made, had given the filling in front of the city at about fifteen feet, and my soundings coincided approximately with those other soundings that I have just mentioned

Q. Whose soundings were those? A. Soundings made at different times by some of the employés of the State Engineers' ~~Dept~~ ~~office~~ Department

Q. I may want to call your attention to this mater again. Have you ever been up the Sacramento River, more than

3165

the one time? A. I was up at Gold Run and from there came down following the American River as far as Auburn, on the first trip of which I have spoken in my testimony

Q. When was that first trip?

A. Including my measurements at Gold Run it was from November 3d to the morning of the 10th of this year

Q. That was from the time you went to Gold Run, until you got down again to Folsom? A. Until I returned to Sacramento

Q. Until you got again to Sacramento, that was once?

A. Yes sir

Q. When again? A. I went up again on the evening of Saturday, November 12th as far as Auburn, and descended along the line of the river to Folsom on Sunday

3166 the 13th. On Monday November

14th I returned to Sacramento from Folsom

Q. From Gold Run you came down to Auburn, between the 3d and the 10th, on the 12th you returned again to Auburn, and came down to Sacramento, is that right?

A. Yes, sir, I think that is right.

Q. Is that then the only trip you have made for the purpose of examining this river? A. There was one other examination made from the mouth of the river up seven or eight miles in connection with a surveying party for which I was topographer, and for which time the river was aligned, and topographically examined

Q. When was that?

A. That was in January 1879.

Mr Cadwalader Was that the Manson survey of the

3167

river? A No sir

Mr Belcher. When you went up on the 3d General Cosby went with you? A. Yes sir

Q. You made no examination as I understand you, of Cañon Creek at the time, and saw it only as you approached it for the purpose of going into the mines? A. That was all

Q. Then all that you say in regard to Cañon Creek, its grades, was a matter of pure guess work? A. Not guess work. I estimated its fall from what I could see looking into the cañon from above, my general knowledge of the appearance of a river, or cañon

Q. From how far above?

A. I was between fifty and one hundred feet above the bed of the stream at the point where I saw it

Q. At the point where you

3168 were could you see any

considerable length of the bed of the stream at that point? A. No sir

Q. How much could you see? A. From any one standpoint a few hundred feet

Q. Did you have more than one standpoint?

A. In walking along there I may have looked into the creek at two or three different places

Q. You may have, did you?

A. I did certainly, because the number of standpoints varied as I walked along the trail

Q. Did you give special attention to that creek, and did you at that time apply any judgment in regard to the creek and the inclination of its bed?

A. Yes sir, although at that time I did not express it in figures

3169 Q. You did not express

it in figures, did you make a memoranda of it?

A. I remember it distinctly that it had an average fall which was probably 1,000 feet per mile

Q. Which was probably 1,000 feet per mile? A. Yes sir, if that had been extended to the length of one mile

Q. And that was at the point where you first approached it. Where did you stand when you gave your attention to the bed of the creek? A. In going to the pit of the Indiana Hill claim, we walked around a ridge or hill before entering the claim itself. While on the brow of that hill we were at a point, or at a number of points where we could look into the bed of the creek

Q. A number of points where you could look in, and where you did look in? A. Where I did look in

3170

Q. And when you then formed a judgment as to the inclination of the bed of the creek, the slope? A. Yes sir.

Q. You have ~~no~~ a present recollection of what that was, although you made no memoranda of it at the time? A. Yes sir

Q. And you then thought it was 1,000 feet to the mile? A. That is, if extended for that distance, it might be expressed that way

Q. Can you fix any point that would designate it to us so that we might know where you were when you looked down into this Cañon Creek, and made your estimate? who were with you - first fix your place?

A. The place is as I have described it, a short distance before entering the claim itself in passing around the Crow

3171

Q. Did you pass around on on the north, northeasterly, or southwesterly side?

A. East or northeast

Q. The eastern side or north east of the claim?

A. Of the hill, and it was also northeast of the claim

Q. Northeast of the claim on the northeasterly side, you passed around on the outside of the rim, or inside of the rim?

A. On the outside of the rim, on that side which is toward the creek

Q. On the side toward the creek? A. Yes sir

Q. And you passed around down, how far?

A. The distance travelled while within view of the creek I think was about 500 or 1000 feet, it may have been less.

Q. You were on the regular trail? A. Yes sir

Q. You say you were?

3172 A. Yes sir

Q. Now then what part of Cañon Creek did you see? was it above or below the mouth of the tunnel?

A. I did not see the mouth of the tunnel but I understood that this portion of the creek was above the mouth of the tunnel

Q. Then you did not see the mouth of the tunnel at all or the creek below it?

A. I did not see the mouth of the tunnel, and saw Cañon Creek only just it comes in the American river again. That is the only other point that I referred to in my previous testimony

Q. Between then, the mouth of the tunnel, and its mouth in the river, or the North Fork, you have no knowledge at all except the little that you saw right at the point of junction?

A. That is all

Q. You were asked in regard to the velocity of the stream, if it was one foot deep or at one foot, or at little less than two feet you stated, a number of cubic feet per second flowing into the Park, and you were asked what would be the increase ~~of velocity~~ in quantity or the increase in velocity if it were twenty-five feet deep. Now if it were two feet deep and the velocity of two feet per second; then again if it were twenty five deep you were asked as to the velocity, and what did you give as the ratio?

A. I gave at that time that the velocity would be sixteen feet but it was a very rough estimate

Q. What did you give as the formula by which you were to determine?

A. As the square root of the depth, but I did not attempt in my mind there to work those out exactly at that time. I think that the velocity then given by me is about right according to that ratio

3,784

Q. If it were twenty five feet what would be the square root of it? A. It would be five

Q. And the square root of two? A Would be 1.4

Q. Would 1.4 multiplied by five produce sixteen

A. No sir

Q. Or five divided by 1.4?

A No sir, the velocity I have given for a depth of two feet was two feet if I remember rightly.

Q. Well, call it 2 feet, just take a piece of paper and make your formula there and produce the result (the witness did as requested)

A. I see that I was mistaken

Q. Let us see what you do first?

A The square root of twenty five is five. The square root of two is 1.4

Q. Well, then what? what did you do then? I want to get your procedure first?

A. I divide first by 1.4 and

3175 multiply by 2 and the result

is Seven.

Q Seven: seven instead of sixteen? A. Yes

Q. You were then mistaken entirely as to the result at which you came here, setting your figures very much larger than what they would bear, upon the first calculation

Mr. Hart. He said yesterday that he could not state it exactly but simply made an estimation without a calculation

Witness. I made my statement just from a calculation made mentally and I must have assumed one of the figures wrong or multiplied it wrong and for that reason gave the wrong result at that time

Mr. W. C. Belcher This was a sort of running guess here then. I want to know if a good many of your calculations were not of the same character?

A No. All the calculations that I have made were based upon
3,178 such data and evidence as I

Cones see and determine.

Q. Now you came down the river from Cañon Creek to Auburn in how long a time?

A. In Cañon Creek to Auburn, in two days

Q. What is the distance?

A. I do not remember it exactly. It is about 20 miles

Q. About twenty miles?

A. As I have estimated it in my notes

Q Did you go in and out from the river, have some stopping place for the night, and so right through?

A Yes. After the first days travel I stopped at Colfax and descended into the river again the next morning

Q. You came down in the saddle

A Down in the saddle – yes

Q. And accompanied – who accompanied you?

A General Cosby on the second day. On the first day General Cosby, Mr. Allardt and Mr. Humbly.

3,77

Q. They were with you the first day and General Casby alone with you on the second. Did you measure the distances at all? A. No. I estimated them by the time required to travel from point to point and also from a map after my return to this office. The distances were not noted at the time of my examination in the Cañon

Q. From whence did you get a map? What was the map from which you took these distances?

A. It was a copy of a portion of Doolittles map of Central California

Q. Was that from U. S. Surveys? Do you know whether it was or not? A. I think his map is based on U. S. Surveys and is quite a good map

Q. That is, looks well?

A. No. So far as —

Q. (Int'g) Do you know anything about its accuracy yourself?

A. Yes. From comparisons and information received elsewhere, received from the U.S. Survey or General's office in part. It is a better map than is generally made of any section of the country

Q. Of that section of the country?

A. Of any section of the country; comparing it with maps generally as made in this State

Q. Do the U.S. Surveys attempt to meander the rivers?

A. No.

Q. Or do they attempt to give the distances with any accuracy at all from point to point along the river?

A. They give the cross sections of the township lines, range lines and section lines.

Q. And those only?

A. And those only

Q. Is that river crooked or straight?

A. It is crooked

Q. Then upon a U.S. map, the length of a river and particularly
3,79 of a crooked river like the

North Fork, the Middle Fork or any of the Forks of the American, or indeed of any part of the American, the distances represented upon such a map would be a matter very much of guess work, would they not?

A. No. It would be very close approximation in some cases

Q. In some cases?

A. And in all cases an approximation.

Q Yes? Some sort of an approximation

Mr Hart He did not say some sort of an approximation

Mr W. C. Belcher Well, I said some kind

Mr. Hart. But you are not testifying

Mr. W C Belcher. Do you know the distance from Cañon Creek to Auburn from any other source than from the Doolittle map, and your own passing over the ground in the saddle?

A. No, I do not think that I do.

3180

Q. You called it twenty miles.

Mr. Cadwalader. He said, what his notes said.

A. No. I cannot give the distance as I have noted it in that book as my estimate. I do not remember now what it is.

Q. You do not remember now what it is?

A. I said it was about twenty miles, somewhere near there.

Q. Is it not true the the U.S. Maps — and I mean now the plats that come from the Surveyor Generals Office — of public surveys, are never esteemed as accurate at all with reference to the lengths of rivers or creeks, and not very accurate, indeed, in many other respect

Mr. Cadwalader. I suppose that would be hardly a fair question to ask a witness; especially of the surveys made by U.S. in California

Mr. W. C. Belcher. There are a great many of them that are 3181 incorrect

The Court. If the witness does not know, he can say so

A. The maps as returned from the Surveyor Generals office are presumed to be correct so far as the exterior lines, the subdivisions of the townships and the extreme cross sections are concerned

Mr W. C Belcher That is a presumption

Mr. Cadwalader. He did not say that

Mr W. C. Belcher Yes? Now is it among the possibilities that a U. S. Surveyor however competent an Engineer he may be, can locate a river crooked like the Forks of the American river, without having made an accurate survey of it?

A. He can certainly approximate its position

Q. Do Surveyors generally approximate? I had supposed that there was an exact science

3182 Mr. Hart. We object to the

Counsel stating his supposition to the witness. He can ask questions but not make supposition.

The Court Proceed.

Mr W. C. Belcher I ask you again if it would be among the possibilities for a competent Engineer who was making a township survey to represent the American River, or the North or South Fork or the Middle Fork of it, upon a plat with any fair degree of accuracy, without having made a careful survey of it? A. That would depend on what you call a fair degree of accuracy

Q. Well, when they survey the township lines they will be how far apart north and south?

A Township lines are six miles apart

Q. Six miles apart?

A. About that

Q. Now, if these lines are six miles apart is it possible that

3183 there should be a good many ~~[illegible]~~ bends and windings of that river before you reach another line.

A Yes. But the townships are sectionized

Q Well, even if they are sectionized? those are one mile apart are they? A. Those lines are one mile apart - yes

Q. Is it possible that there should be a very considerable bend of the river, within a mile? that it should fold in upon itself? A There is not generally in the American river, where its cañon has a very great width itself, where the Engineer can hardly be mistaken in completing those windings between the points where he has located the river exactly.

Q. Now in the determination of quantities you used the parabola?

A. I have used the parabola as giving the approximate form of the natural bed of the river

Q. Is the parabola the form

of the bed of the river where ever you have seen it on the American river, in any place

A No, it is not

Q Even approximately

A. Taking the whole river, the entire sections of the river, it is approximately the best representation of the river bottom

Q Have you ever found the river bottom where it came down to form a figure like that, winding around? is not the bed of the river flat?

A I have seen the river at certain times coming down with steep sides and with a horizontal bottom. At other times it came down to a certain shelf which would run out horizontally for a certain distance, then down and form the river bottom. At other times it would have a more uniform curved appearance

Q Where have you found this curve, uniform curve, on the 3185

American river

A The general character of the river near the mouth of Cañon Creek is of about that condition.

Q Near the mouth of Cañon Creek! what is the bottom there?

A The bed as existing at present consisted of large cobbles, smaller cobbles, gravel and sand

Q What is the width of it on the bottom?

A The width near Cañon Creek is about one hundred feet.

Q. Do you mean above or below when you say near?

A. Below Cañon Creek

Q In the immediate vicinity of Cañon Creek, below the mouth of Cañon Creek?

A In the immediate vicinity of Cañon Creek, below the mouth of Cañon Creek, it is one hundred feet.

Q And that you say is shaped like that?

3186

A. It has a general curve

Q. Lowest in the center, or approximately so?

A. Lowest in the center or approximately so.

Q. And that for what distance along the stream

A. The character changes very soon afterwards. The material lying in the bottom has throughout a finer character, than right near Cañon Creek, and that finer material is deposited quite horizontally

Q. Horizontally?

A. Across from side to side; between the natural Cañon slopes

Q. Now as you went along down the stream you saw water washed rocks up on the sides of the Cañon ~~or~~ on the sides of the stream at different places and at different heights. In one place you found sand that had been left there, forty feet above the level of the stream, if I understand you correctly? A Yes sir about that

Q. Where was that?

A. That was at a place which I call Kellys orchard between North Fork dam and Rattlesnake Bar

Q. Why did you call it Kellys orchard? A. Because I understood that a gentleman by the name of Kelly occupied a house there, built on the right bank of the river and had an orchard there.

Q. Was it on the side of his orchard that you found it forty feet high? A Yes.

Q. Above or below his orchard?

A. I think it was just below his orchard

Q. And on the same flat, on a level with his orchard, or above it? or was his orchard higher?

A. His orchard was higher

Q. His orchard was still higher?

A Was still higher than the material which I saw there

Q Now when you saw that material

3,188 could you say whether it had

been there one year or forty years

A. Not from a simple inspection of the material — no

Q. It was white sand?

A. It was white sand.

Q. An inspection of the material would determine whether it had been there or whether it were there one year or forty years or more?

A. No. But from its position it must have been left there by the last high water

Q. From its position? it was behind rocks, was it?

A. Yes. Or projecting rock,

Q. It was behind a projecting rock or rocks? A. Yes.

Q. Then why could it not have been left there forty years ago as well as by the last high water? was there any reason, in nature, why it could not have been as well forty years ago, say in the flood of 1845?

A. Yes. Because the water flowing pas~~sed~~ there will cause that sand to act as any other sand would in a similar position. It would move it, and keep on moving it; and this sand left there after the water goes down would be new material, to some extent at any rate

Q. Now was there any evidence there to show you, or from which you could testify, that the water was at that point last winter at all? A No,

Q Was there any evidence there to show you that the water had been since the year 1849 up to that point?

A. No. Nothing farther than water-washed or well-worn rocks which evidenced that the water frequently rose up to that elevation

Q. Do you find water-worn rocks that are a long way above the floods?

A None that are clean?

Q Clean? A. So worn as to show that strong currents

3.90 have been acting on them

Q. Do you find water-worn rocks in almost every mining claim in the State?

A. By those water-worn rocks of which I am speaking, I mean very large boulders on the banks of the canons and on the bed-rock which are not movable by the force of the water

Q. Do you find in every mining claim, or almost every one in the State, water-worn rocks, large boulders, that are distinctly and clearly water-worn, so recognized by every body that talks of them?

A. I have not been in those mining claims

Q. You do not know any thing about, then, the mining claims of the State?

A. None except the Gold Run Claim

Q. Did you see any such water-worn rocks in the claim which you visited on the 3rd and 4th of November?

391 A. Yes. The bed rock where I

saw it appeared to be worn

Q. I ask you if you saw them in the claim? A. Yes. In the pit when I saw the bed rock where the material had been washed off down to bed rock, it appeared to be well water worn, water washed, rounded off

Q. You have spoken about there being a rim left on either side. Did you see off in the sides, water-worn rocks? A. I saw there what I would call cobbles and gravel, all of which were water-worn

Q. All of which were water-worn? A. Certainly

Q. Then the fact that you find up forty feet from the bed of the river a water-worn rock is no evidence that the water has been there within the last fifteen years, is it? A. According to the appearance of that rock it may be.

3192 Q. According to the appearance?

A. Yes.

Q. Now, what is the difference in the appearance?

A That rock which I have been guided by, or those rocks, in estimating the elevation to which water will frequently rise, are very large, are boulders, or are the rock of the mountain banks, which have polished off and kept clean by the action of water which must have been quite recent. In some places that I know the granite was polished smoother.

Q. Where you found this sand, which was a little below the orchard, was it a little behind a boulder? A Yes.

Q How large a boulder?

A It was a boulder of a portion of the bed rock projecting out from the slopes of the sides —

Q. (Intg.) What do you mean by bed-rock?

3193 Mr Hart. Let the witness

finish his answer

Mr. W C Belcher Very well. Finish you answer first

A It was standing up at an elevation of perhaps fifteen feet from its own base to its top and a ledge of rock connected it with the higher bank back at each side. From the base of that rock down to the water, the bank continued to slope so, that the rock itself was at a considerable elevation above the water surface

Q. How much elevation?

A I think it was about twenty feet

Q About twenty feet?

A Yes.

Q. And it was behind this rock that you found sand?

A. Yes, in a position behind it, and some distance down stream below it, as influenced by this water

Q. No matter how far influenced. I am merely ask- 3.94

ing for a fact.

Mr. Cadwalader He has a right to explain

Mr. W. C. Belcher. I did not ask him for any conclusions, and I take it he need not volunteer any

The Court. Proceed.

Mr. Belcher Did you find the rock along the way, which you have called water worn rocks, discolored?

A. They were generally not discolored. When I was in it they were water worn rocks.

Q. When you were in it there was no discoloration?

A. They seemed to be the natural rock, or washed clean of any discoloring matter.

Q. Did you in your examination of that stream notice any discoloration of the rocks along the stream?

A. I did.

Q. Where?

A. At nearly all points along the river above the reach of the water.

Q. Nearly all points of the river above the reach of the water? A. Yes

Q. How high above it?

A. That varied according to the depth of the river.

Q. What was the discoloration?

A. The rock had generally and old appearance. It was darker in color.

Q. Was there anything else besides a sort of grayish color, was it, or dark?

A. Yes. Dark grey.

Q. And that upon all classes of rocks? on slate, sand stone, granite and all that?

A. It refers more especially to the granite. But slate, like granite, has a somewhat a lighter appearance; that is, some kinds of slate ~~itself~~ does, when washed by the water; Other slate when polished will assume a darker appearance and when clean will look

3196 a little darker than it does,

after having been exposed for some time to the action of the elements or air ~~whe~~ without having this disintegrated matter removed by some outside cause

Q. The granite, if I understood you correctly, commenced, as you come down the stream, Rattlesnake? There was a distinct line of granite, slate above and granite below?

A. It was a mile I think below the North fork dam that this change took place.

Q. About a mile below? that is, between the North fork and Rattlesnake?

A. Yes

Q. And there the distinction between the classes of Rocks above and below is distinctly marked is it?

A From there down granite predominated. At that point I noticed a clear distinction between slaty rocks above and granite rocks below

3197 Q. Is it uniformly slate above?

A. No.

Q. But principally slate?

A. But principally slate.

Q. What else? A. There may be various kinds of Geological formations interspersed.

Q. But what you know? ~~But~~ I do not care what there may be; I want to know what you saw?

A. What is principally apparant there besides granite, appearing with slate in smaller quantities is the remnants of those rocks as broken off filling the—

Q. (Intg) The remnants of what kind of rocks? I am not asking what you saw there except as to the character of the rock — What it is. Now you say about a mile above rattlesnake you noticed a clean line of difference; on the one granite predominates, on the other side slate. Now when you go
3198 above, where you come to

the slaty formation, you say that there are other things there I want to know what you saw there.

A. Well I cannot recollect every thing

Q. Can you recollect anything there except slate?

A. I can recollect this fact: That in different points of that river there, I saw deposited along the slopes, or in the turns of the river banks, of ~~the~~ gravel that had been placed there at some previous time, some of which were naturally caving banks

Q. Do you think that answers the question which I asked you?

A. I think that refers also to the rocks placed along that constitute the faces of the river.

Q. Did you see any rock other than slate rock from the north fork dam up to

3199 Canyon Creek, as bed rock

A. Slate and granite I think I said.

Q. Oh! You said slate and granite? A. Yes.

Q. Then you saw granite there

A. Yes

Q. About that point?

A. Yes.

3200

Q. In considerable quantity or very small? A. Relatively I should say in small ~~a~~ quatities

Q. Did you see it at all in the bed of the stream, as the bed rock A. Yes

Q. Where? A. I ~~r~~remember a point & I think it is about three miles below Cañon Creek

Q. With granite in the bed rock of the stream?

A. I thought it granite at the time when I saw it

Q. Three miles below the mouth of Cañon Creek, how wide was it?

A How wide was the river?

Q. No. How wide was the granite which you saw there? was it ~~no~~ upright, standing upright, or was it lying flat? A It was at the side of the cañon, a rock rounded off

Q. Oh! a single rounded

3201 rock? A. Yes. That is the

only rock that I happen to remember now as being granite at that time

Q. I was asking you what you saw there in the bed rock. You have spoken of the sides, and of the bottom as bed rock? A. Yes

Q. Now I was asking you about the rock in place, not what might have been moved there; of the rock in place either in the side or on the bottom, and not of a single boulder which may have been moved there. From the time that you leave the north fork dam up to Cañon Creek, what did you find? Did you find any granite, and if so, where?

A. This rock that I was speaking of formed a portion of the cañon wall, and I think that was granite

Q. You say that was about three miles below Cañon Creek? A. Yes

3202 Q. And on which bank?

A. On the right bank

Q. Did you notice it on the other bank also?

A. On the other bank the rock was less distinct. I did not form any opinion at that time as to whether it was granite or slate, or any other rock

Q. What was the length of this rock, as it appeared up and down? Now I mean of this quality or character of rock – the granite – at that point? A. It was about 50 feet

Q. How much? A. About 50 feet, where the rock was nicely exposed, plain.

Q. And the appearance there was that the river had worn or cut its way down through that granite rock?

A. It had run around that rock, and that rock formed a portion of its side. Whether it had been cut down through, I don't know

Q. Did you find any granite elsewhere than at this point where you speak of, or between those points?

A. I do not remember any just now

Q. Did you examine at the point you speak of sufficiently, so that you can say positively that that was granite, or that there was any granite there?

A No, As I said before, in stopping there I thought that rock to be granite and examined it no farther

Q. Was mineralogy one of the subjects of your study?

A. Yes

Q. And so as to become proficient in determining the character of rock as you see it, and at least from examination? A. With regard to the general character of rocks I am quite well posted. I do

3204 not claim to be an expert at

mineralogy

Q. But with the general forms of rocks, such as sand-stone, slate, and, ~~etc.~~ clay, the ordinary character of rock, you determine in that way by the eye when you see it?

A. Yes. Where the distinctions are clearly drawn. But all these rocks intermingle in such a way that a slate may be almost granite and a granite almost slate, and geniss is almost granite, and it is very difficult indeed to make an exact classification

Q. Do you say that granite and slate run into one another so as to be indistinguishable?

A. I said only in their composition

Q. Well, ~~was there~~ are they in their composition? Are granite and slate of composition so nearly alike as not to be distinguished?

A. We have slaty rocks, which

are composed of quartzy material, which has the property of splitting off in slabs. It is called slate, or forms one variety of slate or slaty rock

Q. Is slate an igneous or sedimentary rock?

A. I do not remember, so that I could clasify it

Q. What is your best recollection now? If you do not remember it, I would like your judgment insteadd of your recollection in regard to its being an igneous rock?

A. Slate?

Q. Yes: A. Yes

Q. And sandstone? A No

Q. What is that? A It is a sedimentary rock

Q. And quartz? A. Quartz, as an ingredient of other rocks— granite and gneiss, is ingneous—

Q. (Intg) Is it sedimentary or not? A. No. It is not

Q. Not sedimentary. Granite do you call that sedimentary or igneous?

3206

A. Granite belongs to the igneous rocks

Q. What do you mean by an igneous rock? A. Formed by the action of fire or heat to some extent. Its exact formation is not know.

Q And you think that slate is of the same character?

A. Yes sir

Q. And hence you cannot distinguish sometimes between Slate and granite?

Mr Hart He did not say that

Mr Belcher I do not think he did. But if he did not, he can so state himself

A. I think there are probably cases when slate, may approach in appearance that of granite, so that a simple inspection will not enable me to determine whether it is slate or is granite, according to the character of the classification.

Q. Now you were in the
3207 claim, the Indiana Hill

claim. Did you find anything - any rock that was like soapstone?

A I do **not** remember any, although some of the rocks had a soft feeling, soapstoney feeling, in being taken hold of

Q ~~Ho~~ Is there any rock there that crumbles under your foot? A. Yes

Q. In those claims? A. Yes

Q. Down deep, in the bottom?

A. It may be down in the bottom

Q. What is there down in the bottom of those claims, or in the claim as being worked, the lower stratum, is there any rock there that is soft like soapstone, or that crumbles under your foot? A. I do not remember any at any point in the bottom of that bed

Q. Or did you see any such rock in the sides or at the ends? A On one of the slopes ~~coming~~ leading down ~~with~~ into the bed I felt such rock under my feet, and crushed one

Q. I ask you now about the lower stratum of the ~~bed~~ gravel, and then we will inquire about the other. You say over the lower stratum there is a bench down to which it was worked at one time?

A. Yes

Q. And below that, you say pits have been sunk? A. Yes

Q. Down to the bed rock or near it? And that through that there is cut a tunnel?

A. Yes

Q. Now down there did you find any rock or see any rock of that character?

A. I do not remember any.

Q. Would you be likely to remember it if you had?

A. If I had examined it, I would have remembered it. But that I could not have determined without crushing

3209 or breaking the rock, and

making the examination

Mr Cadwalader The witness went there to make a survey, and not a geological examination

Mr Belcher Do you not know as a fact, that all the rock there is down in that bed, gravel, boulders and the material that you find there, is altogether harder, not only than soapstone, but harder than slate

A. No. I do not know that as a fact

Q. You do not know that as a fact? A. All that rock is harder than soapstone or slate

Q. Do you compare it with sandstone? Slate is harder than sandstone, is it? A. Yes

Q. Did you make any test? Did you break it with a hammer?

A. Some of the rocks were struck with a hammer in my presence there, and gave out a loud ring, were hard. Other rocks were struck and broken

3210

Q. You can break a hard rock, can you not? A. You can certainly break a hard rock

Q. Did you find any there that you could crush with your hand? A. I did not try the breaking of any with my hand; excepting to feel of such material as had been crushed.

Q. You spoke of the boulders there. What did you say about their size? A The boulders in the claim, do you mean?

Q. I mean now, in this lower pit, the deepest pit?

A. I saw boulders there of varying sizes

Q. From what? A From the finest sand to rocks having a foot or more smallest diameter

Q. A foot or more was the largest you saw? You speak of those as the largest; a foot to or eighteen inches? A. No. I would not; because I saw there a
3211 tree petrified, that was

rock

Q Now do you mean to convey the idea — that is what I want to get at now — that the boulders or rock which you saw there in that pit were round rocks, water-worn rocks as we ordinarily call them, and that the largest of them were not to exceed two feet in diameter, and going from that down, by a steady easy graduation until you came to find sand? Is that what you mean? And that the largest of those rocks were not to exceed two feet in diameter, with the exception of this petrified tree which you found? A. No. My examination was not close enough to make any such statement. I could not venture to say what was the largest or was the smallest

Q. Was it close enough so you can state at all what it was, with any proper

3212

degree of accuracy for an Engineer to state it - an expert?

A. The rocks from the size of one to two feet down to finer material predominated there. They composed almost that entire mine

Q. Almost the entire mine?

A. Yes; together with the binding material forming the cement

Q. Now is there any considerable quantity of sand there? You spoke about sand?

A. Not sorted out. It forms an ingrediant of the material binding those rocks together

Q. A considerable element of it? A. It is considerable

Q. Did you make any calculation while you were there? Did you make any data from which you could afterwards determine as to any proportion that should exist between the sand and rock?

3213

A. No, I did not

Q. Or whether it constituted any considerable portion of it or not? Was it simply a cursory look at the wals of that pit?

A. It was simply a cursory examination of the material as I saw it while making my survey

Q. Had you ever been in a mine before?

A. It was ~~of~~ my first visit to a hydraulic mine

Q. And your last?

A I have since seen those various claims along the American River, while making this examination?

Q. That you saw in following the stream down in the saddle?

A. Certainly

Mr Hart I do not understand the witness to answer that question, that the whole

3214 trip was made in the saddle

The Witness No! the entire trip was not made in the saddle

Mr Belcher How much was made in the saddle?

A. As far as Rices' Bridge; ~~He~~ we travelled in the saddle. From Rices Bridge for a distance of two and a half miles, I travelled on foot

Q. And then? A. Then, after reaching the cañon gain, some distance below-- no, right at the mouth of Shirt Tail Cañon-- I ascended the river for over a mile on horseback, ~~and~~ went up a short distance on foot to the point at which I had seen the river before, then, on horseback, we continued as far as the junction of north fork and middle-fork; from the north fork bridge to north fork dam I saw the river at several points.

Q. I do not care what you

saw of the river, but was asking you now if you came down in the saddle, and you said not altogether, and then I wanted to know how much you came in the saddle, and how much on foot? A. I was just going to add that this portion of the distance was travelled in the saddle. from North Fork down to Folsom on my second trip I travelled on foot, being in the River Canyon or on its sides, to within about one mile of the Junction of the North and South Forks,"

Q In the determination of the character of rock, your experience has been very little I suppose, and all that you have had is simply your school study? A. I have had very little practical experience,

Q. No work in the field at all? very little expierience ~~at the~~ any way other than your
3216 school studies? A. No.

Q. Now your eye has been pretty well acustomed to measuring distances? A. Yes

Q. Where? A. In connection with the Surveys along the ~~Sacramento~~ different Rivers of the Sacramento Valley.

Q. Did you ever undertake to, or did you, in your coming down this River, undertake to correct any of your guesses by the eye, ~~wh~~ by measurements?

A. Yes.

Q. Where? A. There was one point several miles below the mouth of Canyon Creek, where, with a tape line, I measured across from one side of the River to the other, all excepting the distance of about forty feet in which the water was flowing

Q. That is, you measured up to the water and then stopped

A. Yes.

Q. And guessed the ballance?

A. And estimated the ballance

Q. That is estimated by your eye? A. Yes

3217 Q. Is not that guessing?

A. No.

Q. You say not guess?

A No

Q. Does it not approximate pretty nearly to a guess?

A. No it does not

Q You think it better than that?

A. Yes

Q. You approximate the distance by the number of hours you were on your horse? A Yes. on my horse and on foot, in connection with a map afterwards used in the office.

Q. Did you have the Dolittle map there? A No. I did not have the Dolittle map there at the time,

Q, Then when you made your estimate of the distances as you came down, and sometimes ~~as you~~ made your estimates of quantity you made them from your eye as to the distances across, and from your horse as to the length of the distance up or down the River, and from

3218 your own walking at other

places? A. At the time of travelling there ~~&~~ I estimated only the width of the River and formed my conclusions as to the depth of material ~~the~~ River by the general appearance of that River, the distances I estimated after my return to Sacramento, from the length of time required for me to go from point to point, and check that work by this map of which I have already spoken. Those distances are only given as approximate, They are as nearly correct as I could get them from ~~wh.~~ all the examinations I made,

Q. Now would it not be, for any man not at all acquainted with that River, a matter of pure guess work to go up ~~to~~ ~~the~~ we will say to Rattle Snak bar or to any other of the points along that River, and to determine what was the amount of sediment within a mile or

3218 two miles or three miles

of that point, up or down the River, from riding along there as you rode along?

A. I ~~only~~ ~~so~~ Not entirely so because there are evidences left there everywhere by nature showing about what the River is where there is no filling and giving the observer an opportunity of arriving at a general Conclusion as to what the probable depth of deposit there may be.

Q. Does the Section of the River Constantly vary as you go up and down? A Yes

Q. The sections Constantly vary

A Yes

Q. Is it the fashion of Civil Engineers, when they are called on to determine quantities, to do it without determining any Section by actual measurement of the length or width? is that the fashion among Civil Engineers as you studied your profession? A The

3220 Engineer will have to base

his estimates on the best information he can get

Q. Could you have measured the width of that River?

A I could certainly

Q. Did you measure it?

A. I estimated it

Q. Did you measure it?

A Not with a tape line

Q. Did you measure it with anything at all? A. By Eye I did.

Q. On one side of the River, with your Eye, you measured it, you measured it from the top of a high bluff at one time? A. Where I have noticed the widths —

Q. (Inty) Is your eye an old and practiced Eye?

A. It is but a practiced Eye

Q. How is that? A I say it is only a practiced Eye

Q And only with a moderate amount of practice? it has not seen more than six years of practice has it?

3221 A. No, not more than that

Q. You did not measure a mile along the bank of the River?

A. No

Q. You did not measure the depth of the sediment at any one point by kneeling down and determining what its actual depth was?

A No

Q. Then do you mean to say that you took the best evidences or data which you could get for the determination of quantity there? A I said the best evidences which were at my disposal in consequence of the examination which I made?

Q. I asked you if the best you could have gotten. Could you have measured the River from bank to bank accurately? Engineers have instruments to measure with do they not?

A. Certainly.

Q. Do they have something better than a tape line to

3222 measure the distance across

A. A Tape line is a very good instrument to measure those distances, Those distances across could have been obtained, of course! the distances across the surface of those bars could have been obtained

Q. But you did not measure them? A. I did not measure them; I estimated them.

Q. You did not measure one of them? A Not entirely across.

Q. Except with your Eye?

A. Not entirely across

Q. When you measured part way across and got to the water, were you afraid of getting your feet wet by going across?

A. I considered it entirely unnecessary to complete the distance, having measured it almost entirely from one side to the waters edge and there being but a small gap and knowing that all my

3223 Estimates of distances were based

upon —
Q <Inty> On your Eye
A. Yes
Q. Based on your Eye
A. Based, Judged by the Eye
Q. Now did you base your
Estimate of the ~~depth~~ width of the
bottom of the stream upon
measurements made by your
Eye ? A. I said I did
not measure that at all or
Estimate that in any other
way than by taking the
surface of the stream and
surface of the deposit as a
straight line and considering
the material in the bed as
limited or bounded by a parabola
or parabolic form so that the
cross sectional area of that
deposit would be given as
the contents of that parabola
Q. You took then a parabola
of a given form and character
all the way up and down that
stream did you ? A No.
Q. You ~~estimated~~ adapted the parabola
3224 In each case to the sides

of the stream? A If you will please understand me, a parabola may have almost any form It may be very flat or very much curved, The contents limited or included between the parabola there and the horizontal line connecting any two of its points is the same, no matter what the—

Q. (Intg) That is why you said two thirds of the greatest width by the greatest depth

A. Yes. That will give the surface area of that part of any parabola.

Q. Now do you mean to say that at any one point on the River from Folsom up it would be fair to use the parabola as the measurement of the amount of sediment deposited.? A No not at anyone point. But when the whole is averaged it will approach the parabola.

Q. That is, if it would not
3225 be fair at one point or at any

One point of the River, when you come to put one hundred unfair points together it makes it fair? A Yes.

Q. That is a kind of argument which is new, I suppose you learned that at school?

A That is one of the laws which have been deduced, from the examination of a great many Rivers; that there beds will most likely assume the form of a parabola

Q Most likely? A Yes. and for that reason I have assumed that original form as being a parabola. I thought that the form that would approach most nearly to the actual condition.

226

Q. And that was the kind of form you thought was easiest of determination, at least one of the easiest of determination, you could not have any thing else that would be so simple for you to figure upon?

A. But that was not the reason why I adopted it.

Q. Take a place in the river where you have an abrupt bluff bank on one side? A. Yes sir

Q The other side spreads out in a flat for some distance and the bank slopes up very gradually? A Yes sir

Q. Will that make a parabola? is that what you mean by the mathematical figure of a parabola? A This may be ~~nearly~~ merely a portion of a parabola. A parabola may have this form (illustrating) coming gradually down toward one side and rise then more rapidly toward the other

Q. Are the parts of a parabola the sides apart, even? that 3227 is; is it a regular figure or irregular? A. If the axis is vertical it is a regular figure with reference to that axis.

Q. Is it a regular figure always, a parabola, or is it irregular? A. It is a curve which is not of uniform curvature. It has a point of greatest curvature

Q. If it were so it would be a circle? A. Yes sir

Q. And not being a circle it is something different, but is it regular or irregular?

A. It is a symmetrical curve, it has two branches, one of which coincides with the other. It is in equilibrium in reference to a central axis

Q. Now I want to ask you again, if it would be among the possibilities for you to have as a part of a parabola, a bluff abrupt bank upon one side of a stream and upon the other a flat upon the margin and then with a gentle gradual slope, off from the bank — would that be a parabola in any decent sense of the word?

A It might conform very nearly to a parabola if those sides were perfectly straight it would be a triangle

Q Well, does a triangle resemble a parabola?

A Some triangles do

Q Which triangle? an isosceles? A. A parabola may be made to conform very nearly to some triangles, but the excess of the surface included by the parabola over that included by the triangle ~~as~~ as 2/3 : 1/2 —

Q. Do you know where Pickering's Bar is?

A I remember no locality of the river by that name

Q. Pickering's Bar is about three quarters of a mile below the mouth of Cañon Creek. Do you know any point about that distance below, No matter whether it is Pickerings Bar or known by some other name?

A If that is the point at which a creek or small lateral Cañon enters the channel of North Fork from the left, at the foot of which is a mining dump, I think that I remember that point, of that com sides; it is near the Iowa Hill trail crossing

Q. No. It is above the Iowa Hill trail. That is Fords Bar. I will ask you then from Fords Bar ~~up in~~ or ~~the~~ from Iowa Trail up the river or to the mouth of Cañon Creek is there a deposit of even depth or a deposit all the way?

A. No sir, the deposit there varies every where. It is not even level across from side to side in all places but it approximates that position

Q. Is that deposit from that point all the way up?

A. Yes sir, as I remember the bed of that stream there is a deposit all the way

Q. And is it left in such position that the stream flows in an equable, even current say from a few rods below the mouth of Cañon Creek down to the trail?

A. Yes sir, the flow there is quite even

Q. Then the filling would be even would it not comparatively?

A. Not necessarily

Q. Well, is it? A. No sir

Q. How do you know whether it is or is not?

A. By the appearance of the river bed

Q. That is the surface of the river as you now see it?

A. Yes sir, the surface of the bottom as I saw it

Q. Now how is that?

A. In some places there are large cobbles, lodged in the form of bars having elevation above the plane of low water and sloping gradually down toward the water surface. These are of different material from the material generally lodged in a river bottom at other places and indicate a different character of the river there from what it is a short distance above or below

Q Do you mean that the slope of this cobble commences from the edge of the stream and slants toward the edge of the flowing water?

A Yes sir

Q. Was there any thing above there at the side to show you that cobbles had come in from that direction where you saw them banked up like that—

A Nothing that I remember now

Q. Did you look to see whether when you saw any thing of that kind — of cobbles?

A. I should like to refer to my notes to see whether that bar of which I have been talking

this is in that position (referring)
I have there made a note
that there is a bank or bench
mining near that cobble bar,
but the cobbles have not the
appearance of having come
from that mining

Q. How could you tell?

A They are lodged in a bar of gentle slope having considerable elevation above the water surface near the bank, and sloping gradually out toward the water.

Q That is sloping down toward the water? A Yes sir a gradual slope

Q. Would not that be just the condition and shape in which the bar would be left if it had been brought in there from the side right at that point and banked up, piled up and then the river had come down subsequently and simply levelled them a little

A. It might have been that

Q. Would n't it be — you say

might — is not that the material and probable change that would be made?

A. It is a probable change that would be made

Q. Then why do you say these rocks did not probably come from that mining?

A. Because in inspecting that bar, the material in it, the cobbles as there seen did not look like the material above in the banks.

Q. Did you examine the banks there to see?

A Not more than just casually to satisfy myself about that bar

Q. Was this the first time you had ever seen a mine, when you went up there to that mine on the 3rd or 4th of November?

A That was the first time I had visited a hydraulic mine

Q Had you had any acquaintance with placer mining prior to that time?

A. No sir, nothing further

than on different journeys in the mountains having seen localities where placer mining had been carried on and having occasionally seen a cradle in motion

Q. Where you saw a cradle in motion was in somebody's house, was it not?

A. On a trip into the Yosemite Valley in 1871 I remember seeing several. I cannot specify the locality

Q Well to come back to these rocks again. You say there was a difference between those in the bank and those on the bar there – this bar ran along at the side and sloped from the bank down toward the current, the current was crowded off to the far side from it?

A. Yes sir.

Q. This was on the right hand side, this bar A Yes sir

Q. And the current was crowded in to the left hand side? A Yes sir

Q. And that bank was abrupt? A Yes sir

Q. And that on the right sloped backed gradually and there was a bank beyond it which gave evidence of mining having been done in it?

A. That was about the appearance

Q. Now you say the rock, upon this bar, sloping down gradually to the water was different from that in the bank and so different that you judged that this rock did not come from that bank but came from some other source. Now I want to know what that difference was?

A. I simply said that the rock had a different appearance and that I did not examine what the difference was

Q. Do you as an expert here, after examination, telling what you saw, tell us that you saw there a difference between the two such as to lead you then to form the conclusion that the one did not come from the other, but did come from a ~~different~~ another place, that is that the rock, deposited there did not come from that bar but must have come from somewhere else, and that you did not notice, so that you can see what the difference was — do you understand the question?

A I do, I think.

Q You may answer it then.

A I will state in regard to that, that the cobbles as seen on that bar by just casual inspection and the same with reference to those that were being turned out by the mine appeared different. I did not examine them scientifically or with a view of establishing their nature, and it does not preclude the possibility of that bar having come entirely from those mountains but I did not think so

Q. You say you did not examine them scientifically, you mean you did not take any one and break it to determine what its constituent elements were, is that what you mean by scientifically?

A Yes sir, that is what I mean, I did not examine the nature of those rocks

Q. Did you look at them to see whether they were of like size, those upon the bar and those in the bed were they of like size comparatively?

A. Upon the bar they were of such sizes as might have all come from the mine

Q. Were they of like color?

A I do not remember

Q. Whether they were or not

A. I do not remember now. I do not recall the exact appearance of that mining ground.

Q. Well then you are guessing whether this came from above or came from that bar. It was a very loose guess was it not?

A I simply stated that it so appeared to me at that time. I do not venture that as a statement that it did or did not

Q Then you do not mean to say that your statement in regard to that is of any value whatever — is not that what you mean to say, or is it? A. That is not what I mean to say

Q. Well ~~do~~ you mean to say that it is of any value, that your judgment in regard to the source from whence the rock in that bar came, do you mean to say that it is of any value whatever?

A. I do not know whether I am competent to answer that question, or not.

Q. Now you gave the depth of the red soil over the surface of this claim as I understand you to say, and I think you represented in your little plat there, you leave here a rim on the outside coming down to a certain depth and then you come in and drop down again? A Yes sir

Q. Leaving a bench here up on each side and then the rim coming up on the outside

A Yes sir

Q Now you gave us from thirty to forty feet the depth of that red earth?

A. I think I said it might be from twenty to forty feet.

Q Well now, did you have any data from which you made up your mind in regard to that, or formed a judgment? A. I had data as obtained in estimating the contents of the four smaller pits which lie around the main pit, the line between that red soil and the bluish colored soil, if soil I may call it, it is a gravel deposit, is not clearly defined. One merges into the other.

Q. Now, is it not true that you had not any data there at all except simply to guess that it may be thirty or forty feet, it might have been one hundred feet just as well might it not, or two hundred or even three or five hundred?

A. I just now said that the line was not defined, one merged into the other.

Q Well, suppose they did not merge at all. Let us suppose they were well defined, had you any thing there before you by which you could have determined? A. I had my instruments there and I could have determined it at that time.

Q Let us see whether you could or not — hand me your book there, I want to take your picture and see whether you can determine from it — is that intended for it (referring)

A. No sir, I have not the notes of the estimates in that book. This sketch that you were just looking at is only a general illustration of the character of that pit as it appears to the observer in viewing it

Q. Do the banks on either side stand upright now, you say there is a rim left?

A. Yes sir, these rims are generally quite vertical

Q. That is steep enough (illustrating)?

A. That is about right

Q. Bring it down on the other side in the same way and you would have there as high a bank on this side as on this? A. No sir (illustrating)

Q. What is the width across there at the top?

A. At the top of the old surface washings it is about seventeen or eighteen hundred feet

Q. Did you determine that with your eye or your instrument? A. That is based upon the plat as submitted here.

Q. Upon your plat?

A. Upon my plat.

Q. Well, I say, did you determine that by your eye or by your instrument?

A. I did not measure that exactly, along any one line by my instrument from one side to the other but from this plat drawn according to scale, I measured from one side here to the other along a cross-section line, across that plat in connection with the plat.

Q. Now, there are eighteen hundred feet between the rims on each side?

A. Yes sir, about that across the Indiana Hill Claim.

Q. For present purposes we will call it 1800 feet?

A. Yes sir

Q. Can you tell anything about it whether the hill from the top of the rims that were left — whether that hill rounded up to a sharp point above or whether there was a slope down from one to the other and there was no rounding at all, have you any data to go by?

A At the south end of the Indiana Hill Claim there is the appearance of an old ravine running up in that direction which would indicate that that was not an unbroken curve across the top, that there was not a regular slope from the one side down to the other, quite a bulge up there

Q. Whereabouts is that ravine which you saw. How far away from this Indiana Hill Claim? A It is at the lower end of the claim, that is of that part of the claim washed — I am not informed whether it is the exact limit

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of that claim or not.

Q. At the lower end that was washed. There you found a place. Does the rim depress from the upper end of the claim as washed, we will say from the railroad or very near the railroad is there a depression all the way down of that rim which is left on that side — is that constantly falling off?

A. I do not think that rim is constantly falling off.

Q. Did it you notice carefully enough, so that you can tell whether it was, or not, a gradual slope from the railroad down, until you came to the end of it?

A. I made no instrumental observation of that.

Q. Well, did your eye measure it? A. To my eye it appeared as though there were a slope down in that direction.

Q. You could not tell what

Kind of a slope it was, your eye is not as accurate in measuring surfaces as distances?

A. No sir

Q. But the slope was upon both sides, that is upon the upper side and upon the lower side, the slope was the same way along all those rims? A. Those rims were not continuous. Points of them were left. It appeared to be the case as you have just stated.

Q. What I wanted to get at was, did you have any thing before you by which you could determine whether that soil above this plane which you have made across there and where the benches are left, whether it was thirty or forty or fifty or three hundred or five hundred feet deep so that you could determine with any accuracy or to make your testimony of any value at all in regard to its depth, that is what I wanted to get at?

A. No sir, I have nothing at all to judge from excepting those rims left standing

Q. And those are 1800 feet apart? A Yes sir

Q. And the length this way is 1200 feet up and down

A. Along the pit, yes sir

Q. The old excavation which was on this survey was two miles and a half up and down was it not? A Yes sir

Q. While the north east pit was what length?

A. An length of ~~about~~ twelve hundred feet

Q. And about eleven hundred feet in ~~length~~ width? A Yes sir

Q. Do you mean that it was square? A No sir, I simply gave those dimensions as measured across, as one would speak of the length and breadth of a pit, that has more or less the form of a rectangle.

Q. Well, was it not more

nearly the form of a circle than of a rectangle?

A. Its form is shown on this plat which I show.

Q. Well, I ask you if it was not more the form of a circle that a rectangle?

A. I think it lies between the two

Q. About half and half?

A. About half and half

Q. Well then as to the depth of this red material which was over, or whatever the color may have been of the material which was over this plane about which the working had been done along this two miles and a half, your judgment as to its depth would be of very little value—that is you have no data from which you could make any accurate determination at all?

A. No accurate determination.

Q. Or Even an approximate determination? A. I would call it an approximate determination to complete than contour

Q If you were going to make it yourself, you would make it this way? A Yes sir

Q You did not have the making of it? you did not make it? A. No sir, that is I did not make the pit itself or I did not make the mountain itself.

Q You did not make the mountain? A. No sir

Q You were not there when it was made A. No sir

Q. If I understand you this above, was a pure matter of estimate, no measurements, except as you calculated the distance across from the top of one rim to the top of the other? A. I do not remember having stated any figure whatever giving the contents of that cross-section or the contents of the surface washings above when the present mining Company commenced its work.

Q You gave its depth as.

from twenty to forty feet?

A. No sir, I simply gave that as the depth of that portion of the soil appearing reddish in color as seen on the bank left standing.

Q. You did not mean then to tell about the center at all?

A No sir

Q. I got a wrong impression from what you said.

A. I said further, that the rim was four hundred feet or about that above the deepest point of the pit

Q. Well now, did you measure that with your eye? A No sir

Q You measured that with an instrument? A Yes sir

Q. You measured the depth there with an instrument?

A Yes sir

Q. So as to be sure that you have got that right?

A. Yes sir, reasonably correct

Q. Reasonably correct?

A Yes sir

Q. But when you are measuring

with an instrument you can get it more than reasonably correct — I will ask you if you are measuring the height of a given point standing before you like that, can you measure it something more than reasonably correct? Can't you measure it accurately?

A. I can measure it accurately as the term accurately is generally understood, but I think that the measurement which I have made, and the results of which I have just stated were made correctly and I think that is reasonably correct.

Q. I think it would be something more than what we usually understand by reasonably correct. Now, as to your measurements; were your measurements to determine the height here from the base level of the top of the pit — was your measurement there from the level to the top of the ~~pit~~ rim as it stood (referring to witnesses small diagram)

A. It was from certain points in the bottom of the main pit.

Q. I ask you if it is from that bench of the first workings up to the edge or the top of the rim which was left standing, was that your measurement

Mr Cadwalader. Is your question directed to the contour line, the claim line, from lip to lip

Mr W.C. Belcher No sir, < to witness > how did you understand the question

A. As to whether my measurement was from the plane to which the surface mining had been conducted up to the edge of the rim.

Q. That is it?

A. My instrument was not placed on that rim for the purpose of estimating that distance, but the elevation of the upper rim and the elevation of that lower plane were determined by observations made by me at different points in or about the mining pit, the results of those observations I have stated, and they include the elevation up from the top of the present pit to the rim or lift on the east and west banks

Q. Now on the west bank what was the perpendicular elevation, the lower rim above the first washings? A I do not remember the figures exactly, I think that I can show you within a few feet on this plat

Q. If you remember approximately you can give it approximately? A The upper rim on the east side is about 250 feet above the bed of the present main pit

Q. Then the rim upon the Cañon Creek side is about now 250 feet above the bed of the early washings?

A. No sir

Q. Then let us see what it is, that is what I was asking you, and I want you should answer that if you can a answer, but this plane, the early washings is not horizontal, it has many elevations in it

Q. Is it approximately horizontal? A. It slopes toward the center pit, and then has approximately, a horizontal position

Q. Now, we will take it then, the approximate horizontal position, and then I want to know what was the height above the plane of the old washings? A. It is about 150 feet

Q. That is approximate?

A. Certainly, as I have just taken it from that plat. The elevations, however were correctly measured, and that plat is, I think, correct

Q. What is that to the inch?

A. One hundred feet to the inch is the vertical scale on which this plat is made

3264 Q. Measure that a little more

accurately so that you can determine and that will give you a better approximation than you pencil would

The Court. Above the plane of the old washings

A. (the witness measures) About one hundred and forty instead of one hundred and fifty feet

Mr W C Belcher Now fix it upon the other side, how much

A. The west rim above the plane just spoken of is about three hundred feet from the top of the present pit on the west side.

Mr Hart. Is that the old or new pit?

A. The old washings

Q. That is from the first rim?

A. From the present elevation of the old rim up to the upper rim

Q. And not from the bottom of the pit

A. Not from the bottom of the pit

Mr W C Belcher. Then what did you mean by saying twenty to forty feet?

A. I said, that in viewing the mine as left standing the upper portion of it appeared to be colored red down for a distance of twenty to forty feet gradually merging into the bluer material.

Q. That is into the sand and gravel, small light sand and gravel which you saw below, that is all, comparatively small sand and gravel down to the bed of this original washing is it not?

A. I said that all this material contained gravel and even coarser material; that the surface soil was a gravelly soil

Q. Red gravelly soil? A. Yes sir

Q. And then below the red gravelly soil, was a gravel comparatively small

Mr Cadwalader. Blue?

A. No sir I do not think I made any distinction between the character of gravel

Mr Belcher. Did you say blue?

A. Yes sir

Q. That this is blue above?

A. ~~Yes sir~~ Near the surface it is red. Below that it is blue

Q. Now then if I understood you and Mr Cadwalader together it is that we have got 20 feet of red sandy earth and then we have got blue gravel from there down

A. What I said was, that we had a reddish colored gravelly soil near the surface apparently about ~~40~~ 20 to 40 feet in depth. Below that a blue material generally called blue gravel, I think, and contained rocks of varying size

Q. That has a distinct blue

appearance? A Yes sir a bluish tint, it is not skye blue

Q Deep blue or light blue?

A. A pale blue

Q. A very pale blue?

A. A slatty blue

Q. Is it blue at all; that is what I want to know. Are you certain now and willing to state whether it is blue at all?

A Perhaps the color generally denominated drab would express it more appropriately than blue

Q. I think it would in my own judgment?

A. I use the term blue in distinction to red

Q. But is it not nearer white than drab? A No sir

Q. You think not?

A. I think not, although drab may have various shades

Q. Well then, when you speak of drabs of various shades, do you speak of this as being a light drab?

A. No, sir, it is about an

ordinary shade

Q. Well now I want to get at a little, your idea of color, because we may have occasion to touch that again. Do you make a pretty clear distinction between drab and blue?

A. I think that is entirely a matter of judgment. If you will present me with a color, I will denominate the name

Q. Without application, I want to know if the two, drab and blue are clearly distinguishable the one from the other? A. Blue is a pure color; drab is not

Q. Does blue enter into the composition of drab at all?

A. Yes sir

Q. It becomes a component part of it? A. Yes sir

Q. What else besides blue composes drab? A. A little yellow, and a little red will make drab in connection with blue

Q. Yellow and red, and blue

together? A. Yes sir

Q. Those are elementary colors?

A. Yes sir

Q. Those three elementary colors combined make drab?

A. Not always, no sir; they do not always make drab

Q. But somtimes do. When they do not do that what do they make? A. They may make any color almost

Q They may make green if they can make any color?

A Yes sir, if you take a small enough quantity of red, plenty of blue and plenty of yellow you will have green

Q. And then you could get violet, with the same colors?

A. Yes sir, by using plenty of red, and plenty of blue and very little yellow

Q. Well now, is there any red in green at all?

A Green is a primary color

Q. Then these things combined will not make green, will they?

A. Yellow and blue combined

make green

Q. You say you have got a primary color which can make by by putting other primary colors together in different proportions do you?

A. I may have been mistaken just now in calling green a primary color

Q. Well if it is not a primary color, does red enter into its composition? A. Not necessarily

Q. If it does not necessarily, does it at all? A. It may in some shades of green

Q. Do you mean to say that these colors are a matter very much of fancy, that you may have green to day composed of red, white and blue, and to-morrow, of red, black, and yellow?

A. No sir.

Q. In coming down the river you came down to Folsom and from Folsom on below did I understand you to say 3271 that from Folsom down to the mouth of the American, its original banks could not be distinguished?

A. I said that I could not distinguish them at what point? Where I saw the river?

Q. Where you saw the river?

A. Where I saw the river

Q. Well, now, at how many points did you see it?

A. I saw it at many points, though the number I could not ~~remember~~ not state from memory

Q. Did you come down the river from Folsom to Patterson's? A. Not all the distance in the river, no sir.

Q. Was there any point between Folsom and Pattersons' where you could not distinguish the original bar ~~bed~~ of the river, at the lower end? A. At the lower end of bar I was in doubts as to the exact location as to the exact location of the river channel

Q. I am not talking about the channel; I am talking about the banks, was there any point between Folsom and Pattersons where the banks were not clearly and distinctly marked?

A. If you mean the bluff banks which limit the overflow of the river, between which lie the bottom lands as well as the low-water channel of the river, I think that those banks are clearly defined throughout that whole distance, but if you simply mean those between which the river flows at an ordinary and at a low stage, those are the ones to which I referred as not always clearly discernable

Q. Is there any point there between Pattersons and Folsom where the banks of the river ~~are clearly~~ ~~defined~~ coming right down to the banks of the river, what we ordinarily mean, and what you would understand to be meant there, where they are not distinguishable to-day and were not when you ~~went~~ were there within the last two weeks?

A. The old original banks you mean?

Q. I do not care whether they are old original or new original? A The present banks are distinguishable, certainly

Q. Then there is a clearly marked and distinguishable bank all the way from Folsom to Pattersons? A. A bank of varying character, yes sir; sometimes being only a gently sloping bar which may extend back for any distance almost until reaching the higher bluff bank, or sometimes a vertical bank, or a bank that is generally termed a bluff bank

Q. Do you know that

it was otherwise there 40 years ago? A No sir, I have no such knowledge

Q. Above Rices' Bridge and from there on, you stated the depth of the flood waters over the level of the waters as they now are, that is as you saw them at low water, to be somewhere from 20 to 30 ~~feet~~ and 40 feet, if I understand you correctly? A. I said that there are no evidences of high water or such marks as I considered evidences, seen along the cañons of the river above there, as being that high above the low water plane

Q. Above the low water point, as you saw it? A. Yes sir

Q. Well where did you see any such evidences - I want you should fix upon some place where you saw that kind of evidences?

A. I think I can do so by reference to my notes

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Q. Very good, Refer to your notes? A. (referring) above Rices' Bridge, about three-~~qu~~ quarters of a mile above the same I have seen ~~portions~~ a number of points where rocks are worn nicely smooth by the action of water at an elevation of from 10 to 15 feet above the water surface

Q. Ten or 15 feet? A. In order to accomplish that the water must frequently rise to a much greater elevation, because if it simply rose to that elevation and remained there, but for a moment it would have no such effect upon the rock

Q. How do you know that?

A. From general knowledge of the action of water upon rocks across which it flows

Q. Will the muddy water of a flood leave a mark just where it goes, and the very highest point to which it goes, always? A. No sir, not always

Q. Will it generally?

A. It will generally leave such mark where the velocity of the water is not too great

Q. Will it not be true that a river as muddy as the Sacramento, or as almost any eastern river, take any river coming out from the Allegany Mountains, or from any of the mountains in New England, or along the Atlantic Coast, coming out from the Blue Ridge, is it not true of all those rivers that when they rise to any considerable height, and particularly in floods, they leave the mark of the highest water all along their course? A They do not always do so, or do not necessarily do so. I have seen long reaches of the Sacramento River where I could find no evidence of high water marks although I have looked for them. At other places the water marks were very distinct, they might have been left by the highest ~~waters~~ ones, ~~or~~ waters, and quite frequently they were not left by the highest waters.

Q. What is the color of the rock from Rice's up, bounding the stream and the cañon?

A. It has generally a gray appearance

Q. Would that be muddied by the high water? ~~wh~~ we have heard about these waters as being muddy? A. It would not be necessarily muddied by those waters

Q. Not necessarily muddied?

A. No sir

Q. That rock was such that it can touch mud and not be defiled? A. Yes sir, mud when well diluted with water as it would be apt to float at a high stage

Q Does the water flow as

fast on the margin as in the center? A No, sir not always

Q. Does it ever? A It may in certain cases where water is forced to flow through a gorge

Q. Well now, is this all gorge above Rices? A No sir, it may be called a gorge, the sides of the cañon have generally a slope of, say about forty degrees

Q. Forty degrees. Now, when you have got a slope of forty degrees, you would not call that a gorge would you or a cañon, at any rate? A I should call forty degrees a very deep valley slope

Q. Are the sides there alike or is there first an abrupt bank upon one side, and then a gradual slope upon the other? A It is generally so that the slope does not coincide on the two sides. It is generally greater on one than it is on the other

Q. Is not that so all the way up from Rices' Bridge up?

A. I think there are one or two localities where it is not so, where it is different, where the slopes from both sides come down at about the same angle

Q. Well, suppose they come down about the same angle is there anything there that you would call a gorge, or a narrow cañon, above Rices'?

A That portion of the river which lies about a quarter or a half a mile above the bridge might be called a cañon.

Q. And above that not as you use the word?

A Well, in my own judgment I would call the entire chasm in which the American River flows, a cañon:

Q, You would call the whole of it a cañon?

A. Yes sir, and it varies in appearance, in some

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places, that cañon is steep and rocky

Q. You say the only marks that you observed of high water there were these rocks up on the banks which were worn smooth by the action of water, that was the only mark you observed?

A. I said those were the principle marks which I had observed. I do not remember above Rices' Bridge just now of other high water marks

Q. Then those, and those were from ten to fifteen feet above the present low water level? A. Yes sir

Q. Could you tell whether these water marks which you saw, the water-worn rocks, had been worn thus by recent waters or ancient waters, or recent floods or ancient floods?

A. I saw rocks immediately above these, also having the appearance of having been washed at sometime or other by water, which had quite a different appearance from those, nearer the water surface

Q. Have you answered the question which I asked you?

A I think that answers it

Q. What was the question?

A Whether I could tell whether these rocks had been washed by recent waters or by ancient waters

Q. Did you answer it?

A. I thought I did

Q. I wish you would answer now - you can say that you can or cannot

The Court (after discussion) Go on and answer the question

A They were washed by recent floods as compared with other rocks exposed and lying at greater Elevations above the water Surface

Q Could you tell whether they had been worn through within the last one hundred years?

A. No

Q. It might have been a hundred or more years ago when they were worn to the smoothness which they now have? A Yes.

Q. Then when you speak of recent and Ancient, you do not mean within the time of the settlement of California

Mr Cadwallader What is the meaning of the word recent as you have used it?

A. I have used it with refferences to the deposits as seen in the River. And in that connection by recent deposits I always meant such as had some destinction or some distinctive feature from those materials which I considered as having been in that River for

Centuries, which I would naturally expect to form the bottom of a River of such Character

Mr W. C. Belcher Have you any reason to expect what would form the bottom of the River of such Character? A. Yes

Q. Why? A. Knowing that water in a confined channel flows with great velocity, exerts a great force, has great moving properties and ~~at~~ exerts those upon all materials which happens to be thrown or placed into its channel; that those materials will be graded according to the velocity with which that water flows; that where it is confined within very narrow canyons it leaves no such material in its bottom at all; that at other places the material will vary in fineness according to the velocity of that River.

Q Do you know either from your reading or examination in regard to the Colorado River and its canyons whether there are heavy deposits of sand there or not? A I have never read sufficiently carefully to know its exact character excepting that in places it has cut down through solid rock for great depths

Q. And for considerable lengths?

A. And for considerable lengths and has kept those canyons clean, practically clean

Q. Have you heard that there were in that canyon great deposits of sand; both in it and below it? A. In Colorada River Canyon?

Q. In Colorada Canyon proper?

A. No. But I know that there may be in any such places where pools of water are formed or apt to stand after the water goes down.

Q In your coming down the River from Canyon Creek did you notice anything peculiar about the sides, upon the one side or the other; whether they

3285 had been disturbed; whether

there had been land slides?

A. Yes. I think I remember several places along there, where the bank was a caving bank Cobbley bank or a deposit of sand, Gravel and Coarser Material in such position that the action of the Water Could wash them down and Cause them to fall into the River

Q That would be one thing? that would be where the River itself was wearing its Channel, that would be the ordinary Course of Rivers would it not?

A The Ordinary Course, A River being level, the soft matter the Water will readily act upon.

Q. But I was asking you about land slides, slides of vast Masses of earth and material from the mountain sides?

A. I do not rember of it

Q. You do not rember any of those? A. None in that Canyon

Q. Do you remember any place there where there was a side hill

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and where it seemed to be perfectly Clear up and down?

A. No.

Q Or a steep inclination

A. I do not rember any locality that would Conform to that description.

Q. You have spoken about mining I believe on your direct Examination and also Cross examination, as to one place. Now did you observe the same thing as you Came along down the River in a good many places?

A. Yes I did

Q. That is, you found a bar upon one side of the River with the appearance of Mining off on the land side Just beyond it which might have produced the bar and which Crowded the water upon the Other side? ~~In some~~

A. In some places that was the appearance — Yes

Q. And you found a good many places like that as you Came

down the River?
A. A number of such places
Q. I rember you said in regard to one place that the depth of the mining was probably small, why did you thus say? A The depth of the mining?
Q. Yes. The earth removed from the Cave or open place which you saw there was probably Comparitively small?
A. I said, I think, that the total quantity taken out there was Comparitively small. I do not rember to what place I refferred in stating that, if that is included in my testimony
Q. That is my recollection of it? A. I do not think it is Correct.
Q. Now did you make any estimate as you came down the stream of the quantity of earth that had been removed from the banks by mining along it? A. No I did not, But

3288 that quantity of material was

Very large

Q. It was in fact very large?

A. It was in fact very large

Mr Hart That is, the quantity that had been removed?

A. That had been removed from those Pits or mines along the River bank, along or near the River bank.

Mr W C Belcher Now from your Observation there could you form any judgement as to the length of time that those bars or beds had been there? take this first One you spoke of, near Rices, along the side, could you form any estimate as to the length of time that that bar had been there? A No. I had no means of ascertaing the length of time.

Q. Where ever you saw mining or evidences of mining on the bank there you saw bars in the stream.

Mr Cadwallader He did not say that

A. No, I cannot say that

I did.

Mr Belcher. Well was there any place where you saw mining or saw the evidences of mining on the banks where you did not find a bar in the stream? A. The mining was generally conducted in such localities where bars had been, where there were bars to be mined; therefore the mines were generally accompanied by bars. I do not remember now of any locality where there was a mine without a bar

Q. Did you answer the question that I asked or answer something else? A. You asked me if I knew of any mine without a bar and I think have answered it.

Q. Mr Reporter just read the question that I asked him (The reporter read). A. I do not remember any such.

Mr Cadwallader Do you mean mining on the banks of the stream or on the hill tops

A. On the banks of the stream or adjoining the stream, so close that the dump would be right into the River

Redirect Examination of C. E. Grunskey

Mr Hart You stated a moment ago to Mr Belcher that there was a very large amount of mining or evidence of a very large amount of mining along the banks of this stream?
A. Yes. along or near the banks
Q. Did you find any material or gravel, ~~or~~ debris or anything, coming from those mines, or anything of any character that might have come from those mines that in any respect compared in quantity with the amount which those mines must have discharged?
A. I did not

Q About what would be the difference in quantity between the amount which those mines must have discharged and the amount which you saw along the streams, making a rough estimate

Mr W C Belcher I understood him to say that he could not form any judgement at all about quantities, but if he can we will hear it?

A. I cannot make any estimate except that that was probably greater than the amount of material recently left in the bed of the channel,

Mr Hart How much greater would you say? Make an estimate, making it small as necessary, so that you can swear that it is at least so much greater?

A I cannot answer that

Q. If all of the discharges of those mines that you saw along the streams had been left in the canyon between

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Folsom and Canyon Creek, what effect would it have had on that Canyon?

A. It would have filled it up quite materially

Q Now you say that there may be deposits in such Canyons as you have described along the Colorada River, I believe, and also in such Canyons as the one through which the American River runs, in places where pools of water stand after the floods, why is that the case,

A. The water in flowing through such a Canyon will always grind out in certain localities holes or concavities in the bank itself, Those holes will at a lower stage of the River, when less water is flowing through have the fluid passing through them with a very slight velocity compared with that which it has at other points, Whatever

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material there may be in the River fine enough for the Water to move will be carried back across the places of considerable current and will be left in these pools These pools will be for the moment of entirely different character from that which the River is above and below, therefore the material brought from above and brought to those pools must be left there to settle until those pools are brought to a certain level,

Q. Is there any rule which you know of in hydraulics that determines when a River commences dropping its material that it is carrying?

A. I do not think I can give a rule generally applicable But I can state upon what principle according to what principals — that deposit will take place?

Q. State the principle?

A. All the material carried

by water has a certain Specific gravity. It is heavier or lighter than water. The lighter Material of course would float. And some sands, as mica sands for instance are light: a very Slight Current is required to Keep them in motion, whether On the bottom of the Stream—

Mr W.C. Belcher (Intg) We object This statement has been made once already.

Mr Hart When you went up to make this survey did you go to make a Geological Survey or topographical?

A. It was merely Topographical

Q, What has been the Character heretofore during the time that you have been in the engineers office, of your Topographical work? A my topographical was generally the Construction of River maps.

Q. What instruments did you usually use in that work

Mr W.C. Belcher We ~~A~~ object to that as immaterial.

Mr Hart, Go on and state what your experience has been in measuring distances with the Eye?

A. In all the surveys which were made by myself or by partys of engineers with whom I was discharging some of the functions of the Engineering party were measured by means of Chains or with another instrument Known as a telescope with Stadia wires and telemetre rod; instruments acknowledged by Engineers as giving Correct or accurate results, In Connection with this work I was frequently platting the topography, and in so doing had to make the alignments of the River or what ever Natural Object I was delineating upon paper, I was Continually occupied in transferring those distances from figures to paper.

Q Well in doing the detail

work do you always use Instruments? A They make all the minor points along a River after the principal ones are determined, It is necessary to Estimate distances or to step them off, or to use such means to get at the distance as are most Convenient

Q Without measurement?

A. Sometimes without measurements, These distances being Checked by such measurements as are made. For instance, in getting the base of the bank of a River, if two points five hundred feet apart, actually measured and determined, I Can with reasonable accuracy Complete alignment of that River bank between those two points, depending of Course upon the nature of the work in hand,

Q What Kind of work do you usually or frequently, I may say do with the Eye?

A. I frequently estimate distances —

Q Now what effect does that have, the training of the Eye in the measurements of distances

A. It makes an Eye, an Experienced Eye, and distances judged by an experienced Eye are generally, of course within certain limits, reliable. Great distances cannot thus be judged

Q. How long have you been in the habit of doing this detail work with the Eye; that is frequently doing it, ~~Q~~

~~Q~~ ~~It~~ A. It has been done in connection with all my work since I have been connected with the State Engineers department, to some extent, of course

Q What extent of distance can you measure accurately, or with reasonable accuracy, with the Eye? how far? how long a distance

A That would depend upon the nature of the country in which the Estimate is made

Q Say across a River through a canyon such as you saw here ? A Across a River or a space where objects intermediate between the two points of sight are visible, distances can be measured quite accurately for several hundred feet 400 or 500 feet.

Q Now from your knowledge of your eye measurement, how much could you be wrong in the measurement of the width of that River at the points where you measured it or partially measured it ? A Any one point might be an error perhaps from 10 to 20 per cent. All of them combined I do not believe to be an error of over ten per cent. I think they are correct, the results.

Q There could not be an error of over ten per cent ?

A. I do not think there could

Q Have you compared your measurements with instrumental measurements made by Mr Wren

A I have not except in a very small cursory way, having seen the sheet on which estimates were presented.

Q How did your measurements compare with his, with his measurements of the same places up and down this river?

A. As to width, I think that my average widths are as great if not a little greater than his

Q And as to length?

A. As to length I made no comparison, I think that our work we found to agree nearly

Q You said that you did not actually dig down through the sediment or deposits in this River Would that be possible?

A Yes. It would certainly be possible at a great expense. It would not be possible for an Engineer making an examination in the fall, to go there and do that at a certain number of places to make any estimates as to the average filling

Q What was the stuff composed of, the deposit?

A. As seen at the surface

it was composed of cobbles of varying dimensions, in the different localities referred to, and from those down to fine sand;

Q I mean above Folsom, How large were the cobbles

A. Cobbles and gravel predominated, cobbles up to 4 to 6 inches,

Q Up to four to six inches through? A Yes

Q Running down to gravel stones? A Yes

Recess Until
2. pm

In the Superior Court of the State of California in and for the County of Sacramento

The People of the State of California
vs.
The Gold Run Ditch and Mining Company

Afternoon Session
Friday
December 2nd/81

Transcript of Testimony

Volume

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Winfield J. Davis
Official Reporter

Afternoon session, Friday December 2nd 1881.

Re-direct Examination of C. E. Grunsky

Mr. Hart— You speak of your estimates of the width of the streams and the length of these bars to be reasonably correct?
A— Yes.
Q— Is not there means by which you can make measurements that are absolutely accurate? A— All measurements are necessarily more or less inaccurate. Measurements made with instruments are generally made reasonably accurate by taking all the pains which the object in view would seem to require.
Q— You spoke today of a formation of slate rock and granite?
A— Yes.
Q— What was your statement in relation to that?

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A- I said that I thought slate was of igeneous origine. Granite also.

Q- Do you claim to be an expert upon that subject? A- I am not an expert in ~~engineering~~ geology although it forms one of the branches studied in pursuing an engineering course of learning

Q- In speaking of the kinds of rock that you saw in the bed and on the banks of this stream and in the several mines that you visited, I understood you to say that you could not always determine exactly the quality of the rock from ~~the~~, a mere casual observation of the river?

A- No sir; I could not always.

Q- Now what was the reason of that - in determining, for instance between the slate rock and granite?

A- Slate rocks and granite rocks - at least some varieties of slate - are ~~smaller~~ similar in composition and have on their exterior surface a ~~smaller~~ similar appearance and for that reason I would not venture to discriminate between the two rocks by simply viewing them. Rocks may be as they appear in the river, tarnished; covered by some substance either the result of the decay of the minerals of which they are composed or left on their surface — as a deposit from water, so changing the appearance of the rock that at first view you would not recognise its true character.

Q— In what branch of your studies as an engineer do you claim to be an expert? What is the particular branch of those studies that you have followed — mineralogy or geology or hydraulics?

A— Each of those different branches form part of the ~~broad~~ learning and practice in Civil Engineering.

Q— What is that?

A— Each of those different sciences forming the basies upon which an engineer is educated may be made a speciality.

Q- ~~Each~~ Which of these do you make a speciality of?

A- I combine several.

Q- What are they?

A- Hydraulic's in connection with engineering, and so far as it relates to the construction of public works, roads, railroads and the like — and hydraulics.

Q- You spoke in your testimony this morning in relation to the manner in which you determined the height of flood waters by the rocks along the banks of the streams and you were asked on that occasion whether or not water left deposits — whether the flood waters left deposits or discolorations upon the banks of the stream or the sides of the canon; upon what does that discoloration and the amount of deposit depend there?

A- These deposits ~~made~~ may be the result of a simple contact with the water carrying in suspension material, that may be left on an inclined surface when the water leaves it or they may be the result of deposits of light material from water forced to move in eddies or whirls behind any obstruction along the bank of the river

Q- Well upon what does that amount of deposit and discoloration depend in these cases? A- It would depend upon the character of the material held in suspension in connection with its quantity.

Q- And on anything else? would the velocity of the water have anything to do with it.

A- The ~~deposit~~ velocity would quite likely influence that.

Re-crossexamination
of
C. E. Grunsky.

Mr. W. C. Belcher- What did you say was the size of the stones or rocks that you found in the bed of the stream above Rice's bridge in your direct-examination.

A- I said that the size varied; ~~which~~ that the size of the material, specified by me, as recent deposit, generally ranging up to cobblestones of from four to six inches; smallest diameter.

Q- Four to six inches smallest diameter? A- Yes

Q- Did you say that there were none or are none there larger than that?

A- No. I said I saw other deposits.

Q- In the same place?

A- In the same section of the river, that were very much larger. I spoke of that bar this morning.

Q- Are you speaking now of the ~~supposed~~ space, or the distance from Rice's up?

A- Yes, that portion of the water above Rices bridge.

Q- Above Rice's bridge

A- Yes

Q- Now when you speak of bars are they in the bed or on the banks of the river?

A- Bars I have generally called deposits in the bed of the river across which my estimates of width extended.

Q- That is as to this particular locality? Your last answer was in reference to the particular locality about which we are talking — that is from Rice's bridge up;

A- It was quite general, as to my discription of the river.

Q- I am asking you about the particular place and the particular thing and if you will be good enough to confine your answer to that, I will be obliged to you.

A- May I venture an observation in answer to his question?

The Court — If ~~do not~~ you think it is necessary.

A- I think that would seem to exclude such bars as Exist in the river below Rices bridge and for that reason I hesitated in answering it.

Mr. W. C. Belcher — When I ask a question in regard to a particular thing I would like to have you answer it and if there is anything else to say you can say what you desire to if it is proper. Now I want to ask a question about the bars above Rice's bridge and between there and Canon Creek? the same question that I asked you before.

Mr. Heart — I object to the question. It has been asked once before and answered and counsel admits that.

Q — From Rice's ~~bar~~ up, did you speak of the bars there as being bars crossing the river and within its channels, or bars at the side?

A — I spoke of them as bars lying within the river channel.

Q- At the side or across it?

A- Generally at the side— sometimes apparently extending across it.

Q- Where extending across?

A- I remember one locality— I think it is what you have specified as Pickerings Bar where the cobbles of the main bar extended across the river.

Q- Are cobbles or boulders there of frequent occurrence that would be of a ~~width~~ weight from two hundred, to five hundred or six hundred pounds and of a diameter from ~~the~~ a foot to three or four feet. Call them cobbles or boulders as you like— rounded stones or rocks?

A- They are not of frequent occurrence of that dimension although there are cobbles there of one foot diameter.

Q- One foot? A- Yes

Q- Now do you mean to say that they are not ~~[illegible]~~ common that are ~~above~~ double that diameter—

two feet in diameter?

A- They are not very common on the surface of that bar.

Q- And following from that bar to Rice's?

A- Or from that bar down to Rice's bridge.

Q- Are those of a foot in diameter common? A- They are not very common as compared with the mass of material there.

Q- Now you speak of measurements with instruments as not being exact is that a rule which is generally announced by your profession, that these measurements are not exact?

A- They are not absolutely exact.

Q- What do you say about the work of the Coast Survey?

A- It is not absolutely ~~accurate~~. correct.

Q- What do you mean by "absolutely"?

A- I mean "exactly"

Q- "Exactly!"

A- So that the difference between that and the quantity required— the difference between the measurements and the quantity as it actually exists in nature is absolutely the same. That is what I understand as "exact" or absolutely correct.

Q- Then you mean by that simply that there is nothing in the world that can be absolutely exact?

A- So far as measurements are concerned.

Q- "When they measure a degree of latitude, within what degree of approximation do they ~~make~~ come?

A- It is very close indeed.

Q- ~~When they are~~ when you say very close please state in decimals or approximate~~ly~~ in decimals whether they come to a thousandth or a ten thousandth or a hundred thousandth of

9312 it? A- The error

may be almost infinitesmally small — ~~unapproachable~~ unappreciably in fact.

Q- Is not it so as a fact?

A- It is so small that we have no contrivance with which to measure it.

Q- Now is it not a Mis Nomer to talk about measuring with ones eye. Is it not simply and strictly guess and nothing else in the world but guessing?

A- No sir it is estimating. If I saw two objects which are comparatively close to me I can by comparing their distance with many other distances, that I have seen measured ~~and~~ form an opinion as to the distance that they are apart. I will say to myself that they are more than fifty feet or that they are less than one hundred and I am sure that the two objects are not less than fifty and not more than one hundred feet apart.

Q- Suppose that you were on a plain where you had never been before and you saw~~e~~ some object off at a distance from you and suppose ~~you~~ now, without knowing the distance at all; but we will suppose it is a quarter of a mile and beyond that is another object - a mountain or a hill or a rock; you do not know the distance - between ~~that~~ and the first object - or ~~say~~ what the first is, or its size and you do not know what ~~the~~ second object is, Can you form any judg~~e~~ment, that would be reasonably accurate as to the distance between you and the second object or its size or anything about it!

A- Under some circumstances an opinion could be formed; under others, none.

Q- An opinion could be always formed could it not?

Mr. Hart- He says not.

Mr. W. C. Belcher- I asked him if there could not.

A- Yes.

Q- But it would not be worth anything unless you had something to guide you and that more accurately that what you stated?

A- Yes; you would have to know a little more than that. That data would be very imperfect to reason from.

Q- What ~~does~~ is the width of this room and the length of it?

A- It is about forty feet.

Q- What is the height of it?

A- It is about twenty five feet.

Q- Forty by twentyfive? And the width of it?

A- About thirty feet.

Q- Thirty feet wide by forty long and twentyfive high?

A- Yes

Testimony of Jim. C. Pierson

Called for Plaintiff: Sworn

Mr. Hart - Mr. Pierson, where do you reside? A- In Sacramento city.

Q- What is your occupation? A- Civil Engineer.

Q- Do you hold any Official position in this county?

A- Yes. That of County Surveyor.

Q- How long have you held that position?

A- I was elected a year ago last March - I took my office then

Q- How long have you been pursuing the occupation of Civil Engineer?

A- I commenced first as an assistant between 13 and 14 years ago.

Q- Did you ever have occasion to visit the Gold Run Mining-the mine of the Gold Run Ditch and Mining Company?

A- I did.

Q- When did you visit it?

A - On Saturday the fifth of November,

Q- Who was with you at the time of your visit to the mine?

A- Mr. Gould, the Superintendant; Mr. Grunsky; General Cosby; Mr. Allardt; Mr. Hindley and two other gentlemen. I did not learn their names

Q- You mean the superintendant of the mine Mr. Gould - the Superintendent of the Gold Run Mine

C A- Yes I understood so.

Q- The one who has testified here in relation to the dimentions of the mine?

~~A~~ A- I was not here at the time he testified. I do not see the gentleman present now.

Mr. Cadwalader - Just go on ~~and~~ with the assumption that it was Mr. Gould the Superintendant

Mr. Hart - What part of the mine did you visit?

A - I visited a claim that I was informed by Mr. Gould was known as the Indiana Hill claim.

Q Do you know upon what ridge that mine is located?

A It is on the divide between the North Fork of the American river and Bear river.

Q Do you know the name of the hill - what it is called by?

A - No sir I do not.

Q Or the ridge;

A No sir.

Q What was the general appearance of the hill. Describe ~~it~~ as nearly as you can the ridge?

A As far as I saw it, the ridge has a direction northerly and southerly I believe as I saw it.

Q Well, what was its general appearance at the time that you saw it?

A Well, that part that

I saw ~~was~~ had been washed out mostly or it had the appearance of having been mined out.

Q Did you see any portion of it other than that which is known as Indiana Hill?

A Yes

Q How far beyond Indiana Hill did you see it?

A I should judge from ~~a~~ half to three quarters of a mile. Between Gold Run and the Indiana Hill claim

Q What was the general depth that the Hill had been mined so far as you could see? Did you make an estimate?

A Well it varied very much. Some places for 100 feet and some places for two hundred or three hundred feet.

Q Well could you tell whether the top of the hill had been mined off generally?

A Yes. It had the appearance

of the top of the hill being mined off to the depth of from one hundred to three hundred feet.

Q- It had that appearance;

A- Yes.

Q- How did you make your estimate as to the amount of mining that had been done, that is the depth to which that mining had been done?

A- Simply by looking at it.

Q- Did you find any data or any basis from which a calculation could be made?

A- Only from the rim that was left around the excavation.

Q- Did you, at ~~that~~ the time you were there, make any particular calculation as to the amount of mining that had been done on Indian Hill?

A- I made an approximate estimate of what had been done as Mr. Gould informed me, by the present company.

Q- The Gold Run Ditch and Mining Company?

A Yes. The top of the Hill had been mined off previous to the commencement of operations by this company as I was informed.

Q Could you see any evidence of that yourself? That is, any evidence of any of the old mining above where he said the Gold Run Ditch and Mining Company had mined from — from the point of their commencement?

A I would not have known that mining had been done previously if I had not been informed of it. I saw no evidences ~~of it~~ that would prove that.

Q You saw no evidences of what?

A That would prove conclusively that mining had been at some prior time, by another Company.

Q Where did he inform you that that mining was done or was commenced by the company, the company of which he was the superintendant

A He pointed out various points and said that they represented the top of their excavation.

Q Now what was the nature of that top?

A In some places it had the character of a bench. ~~and~~

Q And in others?

A In other places it was simply a mark on the slope and in another place there was a pinnacle left standing as a land-mark.

Q A pinnacle?

A Yes, sir.

Q Now above this rim or bench could you see any evidence of mining?

A Yes.

Q Of previous mining — extensive or slight?

A Extensive as compared to the present excavation

Q What was this pinnacle that you speak of?

A It was a gravel and clay bank that had been left standing as a land-mark. I understood him to say that it was on a line between two claims, between their claim and the one adjoining

Q How high was that pinnacle from the bottom of the Gold Run Mine?

A. From the Bottom of the Gold Run Mine I should judge it to be nearly one hundred feet.

Q Now how do you make your estimate? Explain to the Court how you make your estimate as to the amount of mining done by this company on Indiana Hill?

A I estimated the length of the mine, the width of the mine and the length of the excavation. I estimated the length of the mine to be nine hundred feet and the width to be six hundred feet and the depth of the excavation to be one hundred and twenty feet on an average that was a very rough approximation

Q You did not measure it as Mr Grunsky did or did you?

A - No sir I did not.

Q Did you see Mr. Grunsky make any measurements there?

A - I did.

Q What character of measurements did Mr. Grunsky make when you saw him?

A They were instrumental - made altogether by instrumental measurements.

Q Do you know who assisted him in those measurements?

A I did not learn the names of the gentlemen.

Q Were they a part of your party and his or were they persons belonging to the mine?

A - They were persons that I understood had worked in the mine.

Q - Did you, while you were there, make any examination of the character of the material that might be found in the excavation?

A- I did.

Q- What kind of material did you find there?

A- I found the principal material to consist of gravel- a gravel bank cemented together slightly

Q- What was it cemented with

A- With clay and sand and some indication of iron that also seemed to act as a cement.

Q- Did you notice any of the boulders that came from the mine after they had been washed out and left lying upon the ground?

A- No; Not of any size.

Q- Did you notice any of the rocks particularly, did you notice any of the granite rocks there?

A- No sir I did not.

Q- What kind of rocks did you see there?

A- I noticed the bed-rock and the rim rock of the channel,

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of the old channel. The small rocks composing tha the gravel of which I spoke.

Q- What kind of gravel was that?

A- It was water-worn gravel. Gravel that had the appearance of being deposited by the action of water. It consisted of stones of a variety of descriptions

Q- What variety? Can you describe them at this time?

A- I noticed quartz gravel; some indication of granite and slate.

Q- Did you notice the texture of those rocks and the adhesiveness of the particles of rocks? Whether they were very strong and hard or soft?

A- I did to a certain extent. The gravel, itself, did not appear to be very firmly cemented together.

Q- Now what, if any, experiments did you resort to in order to test the quality of the rock?

A- The quality of the rock itself

Q- Yes

A- I took up several pieces and examined them. I noticed one piece of rock; I don't know the name of it, that seemed to decompose rapidly on exposure to the air and I examined that piece more particularly than any other. I found that I could crumble it.

Q- With what?

A- With my fingers.

Q- What did that appear to be when you took it up?

A- It had the appearance of being a small cobbling

Q- To what extent did you crumble that rock?

A- I crumbled a small portion of it to about the size of sand. After it was crumbled, it had the appearance of sand.

Q- You say you do not know the name of that rock?

A- No sir

Q- Did you see much of

that character of rock in the mine — Did you see much of that kind of rock?

A. Not a great deal.

Q— Well, after examining the bed ~~of the b~~ what other portions of the ground did you examine?

A. I went over the mine, from the hill or the rim that was left standing and down into Canon Creek.

Q— Did any person direct you or guide you down there?

A. I went in company with Mr. Allardt and Mr. Hundley and General Cosby. Mr. Allardt had been there previously and he acted as guide.

Q. How did you go down towards canon Creek

A I went in an Easterly direction from the mine

Q. Where did you go to?

A. Down into the canon of Canyon Creek -

Q At what point. A. I went in an Easterly direction from the mine and reached the creek about a quarter of a mile above the mouth of the tunnel. That is about the only way I could locate it.

Q. How far is the tunnel from the mine A. The mouth of the tunnel?

Q yes. The mouth of the tunnel

A. It is about half a mile

Q Half mile. How far is it from the mouth of Canon Creek

A about one mile -

Q Now describe to the Court the Character of canon Creek from the point where you first saw it and as far up as you could see it down to its mouth, where it enters

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into the North Fork of the American River A. At the point where I first saw the bed of the Creek there were some evidences of a deposit of debris so that the bedrock did not show at that point. As I went down the Creek I noticed —
Q ("Inty") Now one moment. As you go along there What was the extent of that deposit A. At the points I first noticed it I did not take particular notice
Q Was there very much?
A. There was not very much evidently. I did not see the bedrock there and I could not tell well how much there was at that point. As I went down the Creek I noticed this deposit down as far as the tunnel — Immediately below the tunnel I first saw the bedrock; I first took notice of the bedrock of the Creek and there the deposit seemed

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to be from two to three feet in depth -

Q Where was that? A. Immediately below the mouth of the tunnel where I first noticed the bedrock

Q What was the nature of the deposit there? A. Gravel and small cobbles and sand -

Q Was there any sand there at the immediate mouth of the tunnel - A yes. Some sand with the gravel

Q What kind of sand was it? A Coarse grayish sand.

Q At that point did you notice any tree? A. I noticed a tree immediately below the mouth of the tunnel that had the appearance of having been — the material having been washed away from the roots of it. It had the appearance and I thought at the time that it

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indicated the ~~effect~~ fact that the bed of Canon Creek had been lowered instead of having been raised by any deposit.

Q. What were those appearances A. The roots of the tree were exposed to the depth of about four feet -

Q How far was that from the mouth of the Canon

A. It was only a short distance. I think less than one hundred yards -

Q At that point did you notice or at any points did you notice about the fall of Canon Creek as it descends towards the River A. I noticed that the fall was very precipitous, was very great

Q Did you Estimate it

A. I connection with Mr. Ablardt I took readings from the

Barometer at the mouth of the tunnel and also at the Junction of the Creek with the North fork of the american and by those readings the fall was determined to be 1020 feet

Q Ten hundred and twenty feet from what? A. from the mouth of the tunnel to the Junction with ~~of~~ the North Fork of the American, a distance of about one mile

Q Was there any water running down the Creek at that time A. Yes. A Small quantity

Q How did it run A. It ran with great velocity

Q Did you notice about the velocity so as to be able to Estimate it A. No

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Q You could not Estimate it A. I could not Estimate it from the fact that in the bed of the Creek there are perpendicular drops and falls- The water rushes through in the Shape of a Cataract in places-

Q In the Shape of Cataract- Could you hear the Sound of the water there A. Yes.

Q How does it Sound? A. It has a roaring sound as water rushing between rocks and through a gorge-

Q How far can you hear that sound, the sound of the water as it rushes down A. I do not know how far it could be heard- I was at one point probably three hundred feet above the bed of the Stream and I could hear it very distinctly

Q What was the nature of the water that was going down the Stream at the time you saw it as to being clear or discolored

A. It was discolored slightly. It did not appear to be carrying much material however

Q. At that time was the Gold Run Mine running A. It was not

Q. Where did you ~~I~~ go to from the mouth of the tunnel A. I continued down Canon Creek, observing the channel as I went down. At about a quarter of a mile below the mouth of the tunnel all appearance

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of any deposit of gravel, debris or sand disappeared. The bed rock from there down to the mouth of Canon Creek had the appearance of being washed clean and smooth and the sides were ground, almost polished, you might say by the action of the water the sand and the gravel. The Creek had cut a channel evidently down into the bed rock. At one place I noticed where it had tunnelled through the bed rock and the water actually run through a tunnel for a short distance. There was one point I noticed where there was a descent of about forty feet perpendicularly and at

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the mouth of Canon Creek there was another fall of about thirty to forty feet vertically—

Q- Where was that

A The second fall was at the mouth of the Creek, at its Junction with the American

Q Now from the point of Entrance to the tunnel, or the mouth of the tunnel into the sides of Canon Creek or the banks of Canon Creek down to the mouth or Entrance of Canon Creek into the American River did you find any considerable deposit

A. I did not

Q You did not. A. No

Q Did you find any deposit there? A I saw some deposit for the

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first quarter of a mile from the mouth of the tunnel down about a quarter of a mile—

Q Could you tell its depth or quantity A. I could Estimate its depth from seeing the bedrock Exposed in places—

Q Was it deep. A. It was not deep. Not to Exceed over two or three or four feet at the most

Q How broad was the deposit A. From twenty to thirty feet on top—

Q And about how long A About a quarter of a mile long—

Q After you got down to the mouth of Canon Creek did you then find any deposit in the North Fork of the American A. I noticed sand and gravel and cobbles and boulders in the bed of the river at that point. The boulders that I noticed were above the mouth of Canon Creek. below the mouth of Canon Creek the material was of a finer nature — gravel and smaller cobbles. I do not remember of observing any boulders in the Creek below that point

Q Was there any considerable amount of this fine Stuff that you saw below the mouth of Canon Creek A. I had no means of observing the depth of it. It did not appear to be a very large deposit however

Q Was it long and broad or narrow and Short A. In width I Should think it was about one hundred feet. It continued down stream — I could not tell the length of it — It seemed continuous down the stream —

Q What did it look like — a deposit there or a gravel bed A. It looked like a gravel bed in the stream but from the nature of the gravel banks that had been washed into it I supposed it had come partly from the mine, if not wholly. That I did not know

Q Could you tell whether or not at the point of entrance into the North Fork of the American the Creek was higher than the bottom of the river or whether the bottom of the river was higher than the Creek right at the mouth A. Canon Creek was higher. The water was running from

Canon Creek into the American

Q Of course that would be true on account of the Extreme hight but I was Speaking of the immediate junction there A. At the immediate junction there was no very perceptible difference

Q Did you make any further Examination after going there A. after going to the mouth of the Creek I returned as far as the tunnel - I went through the tunnel from its mouth to its Connection with the Mine and I came out at the Mine -

Q At the point where the tunnel enters Canon Creek What is the Nature of the banks of the Creek -

A. The banks are precipitous

Q Extending where to?

A. To the Bed of the Creek
Q Directly into the bed of the Creek A. Yes
Q Are there any table lands separating the base of the Canon from the Creek A. There was a graded road, that was all that I observed that partook of the nature of table land -
Q About how steep did the bank run down to the Creek from the mouth of the tunnel A. At the mouth of the tunnel there was constructed a sort of flume the under current of which extended out over the slope until it had a perpendicular fall almost into the bed of the Creek
Q Until it had a perpendicular fall A Yes
Q Then the dump is where A. The dump is at the end of that under current or flume that

I Speak of—

Q It enters at a perpendicular fall into the Creek or nearly to the bed of the Creek

A. Yes—

Q Did any persons point out to you the dump or the conveyance from the mine to this dump

A. Yes

Q Who did it? A. I noticed several cuts in the bedrock, I believe they are called bedrock Sluices, leading to a common centre and I was informed that they connected with a Shaft of about forty feet in depth that connected with the tunnel

Q Well did you afterwards investigate that matter to see whether that was true A. I did—

Q How did you do that

A. I went through the tunnel from its mouth, from its Entrance into Canon Creek to its connection with the Mine

Q Did you go up through the Shaft Spoken of A. I did not go through the Shaft. I went through an incline that brought me out to the Surface of the bottom of the Mine

Q Did you Examine the mine to see whether or not there was any other place of Escape for the tailings and debris coming from the mine A. Yes

Q Did you find any other place of Escape A. No Sir. The Shape of the Mine is that of a basin with high Sides. This incline that I Spoke of and Shaft were connected with the tunnel in the bottom, as though you were to break a hole through the bottom of a wash bowl.

All of the Material that was poured in in Solution or that the water would carry would be forced through the opening at the bottom— The sides were high and the material could not have been forced out of them unless it was carted up by some mechanical process—

Q To what hight A from one hundred and twenty to about three hundred feet in hight

Q What did you see in the tunnel as you went through A. I found about two thirds of the way from the mouth of the tunnel towards the Mine, a branch tunnel, or a fork in the tunnel rather; one leading off to the right and running in a more Northerly direction and one continuing in a westerly direction—

I followed the one running in a westerly direction and arrived at the mine by means of it

Q What did you find there - Did you find any water A. Yes - there was water running through both tunnels - the water coming in from the Northerly one or the one branching off to the right was muddy water. The one coming in that I followed was clear water

Q What was the Character of the mud, did you notice A. It had the appearance of carrying Earth in Solution and Clay

Q very thick A. No sir. discolored only

Q And the one coming from the mine of the defendant, did that have any discoloration A No Sir. That was clear water - The mine was paved in part with railroad Iron. In part the bottom was covered with a layer of gravel. I do not know what was underneath it. At the lower end was a wooden flume.

Q About what was the fall if you calculated it of the tunnel from the mine A. I Estimated the fall of the tunnel at about one foot to twenty four which would give in the length of the tunnel, about twenty four hundred feet a fall of about one hundred feet.

Q Did you notice whether or not the water running through the tunnel had deposited in the tunnel any tailings or debris A. There was some deposit in the tunnel.

Q Very much A. It did not have the appearance

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of being very much -

Q What was the character of the deposit left in the tunnel A Sand and gravel and cobbles

Q Was there much sand

A - Yes - I noticed quite a quantity of sand. At one place I remember it was soft and I sank nearly to the tops of my boots in the sand

Q What kind of sand was it

A. It was grayish sand in color

Q Does it correspond with any of the sand that you see there on the table A. It had the appearance of being like sample No. Six only coarser in nature, but about the color. The sand was wet and that made it difficult to tell what it would look like dried and in a bottle -

Q What further examinations did you make there at the mine if any -

A. After passing through the tunnel I arrived again at the mine. I examined the Sides, the gravel banks again - I think that was all

Q Did you discover anything in your Second Examination of the gravel banks that you have not Stated here A I noticed that on the Eastern Side there was a bank of pipe Clay about from twenty to thirty feet in hight and I was informed by Mr Gould that the Company had washed up to that and no further, that they could not wash it well and had quit washing at that point

Q They had quit washing that portion of the mine

A. Yes. On the Southern Side of the mine was a gravel bank that had been blasted and it lay in position as the blast had left it, where I understood they were going to operate when they were stopped

Q, From whom did you understand that A From Mr Gould - on the western side I noticed a slide that had occurred, where the bank had slid in from the top and was informed that it covered a portion that had been formerly mined out -

Q That slide was into the mine was it A. Yes. I noticed one monitor in position with the pipe attached -

Q Are you acquainted at all with the process of hydraulic mining

A I have seen it done

Q I will ask you whether or not you have had occasion to make any surveys along the banks of the American River A. I made a survey on the line of Twenty Fourth Street produced across the old and new channels of the American River

Q When did you make that survey A. I made that survey on the 30th of November

Q Of this year A. Of this year

Q Extending from Twenty Fourth Street to what object on the other side if any A To the North bank of the present Channel of the American River

Q How did you make that survey A I made that survey— It was an instrumental survey

Q In making that survey did you take any soundings to determine the depth

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of the River and the hight of the River bed, with reference to the hight, or as Compared with the hight of the banks of the River or the Country on Each side of the River

A. Yes - I made some Soundings in the Channel, as much as I well could do from the nature of it. In the immediate vacinity of this point there was a bluff bank on the South Side, Where the channel was running on the South Side - At that point I could get the depth readily by means of a pole - At the point Where my line crossed it the Channel was on the other Side and I could not get at that point to Sound it -

Q. Where did you take Soundings for the purpose of determining its depth at that point. A. Immediately above

Q What did you find to be the Character of the bed of the River at the points where you took these Soundings - A. Sandy -

Q Did you make any Estimate of the depth of the Sand there A. I did not -

Q Now I will ask you whether or not you made a profile of your Survey of this Cross Section A. Yes

Q Look at this and see whether that is it or not A. Yes. That is the profile that I made of the Survey -

Mr. Hart I now offer in Evidence this Profile. It is Piersons exibit No. 1

Q What is the Entire breadth of the River and the length of that Profile A. The distance are marked on there — Commencing at the initial point Twenty Fourth Street it is numbered Consectitively along every one hundred feet

Q It is Twenty Four hundred feet from one end to the other of the profile A I believe it is. The Base line I took as the ground level at Twenty Fourth and B Streets. That is the average level of the City at that point. This Elevation here represents the North levy. It is marked "North Levy". On the South side of the North levy is a road which has been graded up to the hight of probabably about a foot and a half on the North side of the levee the ground slopes for a distance of one hundred and fifty feet until its attains an elevation of only four tenths of a foot above the base line. From that point it gradually rises. At a distance of Eight hundred feet from the initial point it is Six and three tenths feet above the base line. From there it varies from six feet.

Q Right there where it is Six and Six tenths feet, where is that with reference to the old Channel of the American River A. That is on the North Side of the old Channel. The appearance of the ground at that point is a loamy soil mixed a little with sand

Q Where is the old Channel of the American River on that map A. This represents the old Channel. It is marked old Channel

Q Where you say it is one foot higher than the soil on the South Side of the levee A. Yes. It is four tenths of one foot. It is the deepest part of the old Channel as it now Exists. The North bank is not clearly defined. I could not tell where it was the South bank, as it is at the present time, would be the Northern base of the North levee

Q Now go on and Explain it and I will ask you the questions afterwards A. At a distance of one thousand feet from the initial point the soil is loamy— At a distance of Eleven hundred feet there is the commencement of a hop field where there is no appearance of sand covering the land. At the others End At a distance of fifteen hundred feet there is a potato field of the same Character as the hop field— From the point Sixteen hundred and fifty feet from the initial point the sand appears again on top of the soil, covering the soil I do not know to what depth - At nineteen hundred and fifty feet is the bank of the present channel, the South bank of the present Channel of the American River which is an abrupt bank, It is seven feet and a half above the base line, above the level of the City at Twenty Fourth and B Streets, From there it descends to a foot and seven tenths below the base line - A sand bar has formed there extending out about fifty feet - From there there is a drop of a foot and a half to the surface of the water - The first water basin did not Exceed a foot in depth

Q How high is that or how far rather below the base line A. Four and two tenths feet below the base line to the bottom of the first channel— Then the bottom gradually rises until the bar appears above the water— After appearing above the water it descends again to a point twenty three hundred feet from the initial point— The bed of the Stream is four and Seven tenths feet below the base line, and from there it descends into the current of the stream— I approximated the depth of the water there at five feet

Mr. Cadwalader Below the base line A. Eight feet below the base line to the bed of the Stream

Mr Hart The water there is five feet deep you say A. The water is five feet deep approximately

Q Through what Character of Soil does the River run at that point. A. Sandy. The Bottom appears to be sandy from sounding and reaching down with a pole and feeling the bottom

Q What kind of sand, quick-sand A. No Sir. a person would mire in it to a certain depth - It is not solid, not a hard bottom

Q How does that sand in the bottom there compare with the sand along the banks - such as you see in the bottles here

A. I did not see any of the sand in the bottom but I should suppose that it was about the same as on the banks from the fact that the banks are continually breaking down and washing down and the bed of the stream is covered by that material to a certain Extent

Q. How high was the water at the time you made this survey from which this profile was made

A. The hight of the water was three and two tenths feet below the base line

Q How high was that so far as the high or low water mark is concerned

A It was down nearly to low water mark. I saw water marks that showed that the water had been a foot and a half or two feet higher recently

Q At the time that you made this survey did you notice whether or not the water was having any effect on the sand there A. I noticed the bank was caving off –

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Q The bank of what
A What is represented here as the South bank
Q What is that A. That is a sand bar. the action of the water undermined the bar and it fell in from the top occasionally –
Q In large or small quantities A. Small quantities as I observed it at the time, because the water was not flowing very swiftly and there was not a great deal of water there
Q Does it require water of any considerable velocity to undermine this sandbar and cause it to cave into the water A No sir – The sand bar is composed of rather light material, light sand
Q Does it posses

any adhesive qualities

A. No Sir

Q Have you Ever since you have been here noticed the operation of the flood waters on the sands in the bed of the American

A. No Sir, I have not - I have never made any Examination into that

Q I am directed to ask you whether ~~if you know~~ where the water runs there is the new cut off A. It is what I understand to be a cut off

Cross Examination
of
Jm C Pierson

Mr Belcher You went there to the mine for the purpose of being a witness I suppose?

A. I went there for the purpose of examining the mine.

Q. Was it for the purpose of being a witness?

A. Presumably so.

Q. Well Was it not so or was it? Was it or was it not? I want a direct answer?

A. I did not know at the time whether I would be called as a witness or not, but presumed I would be

Q. I will ask you again, if you did not go there expressly for the purpose of making the examination that you might be a witness?

A. So that if called on I could testify.

Q. At whose request did you go? A. I went at the request of Attorney General Hart.

Q. Now when you went down into the mine you found some rock there that was very soft. Was that in the bottom?

A. Yes. The piece that I picked up was lying on the bed rock.

Q. You say when you took it up in your hand it crumbled.

A. I said I crumbled a piece of it with my fingers.

Q. And being crumbled it had the appearance of sand?

A. It had the appearance of sand.

Q. Was it not sand simply cemented together slightly, so that you crushed it in your hand and simply set the particles loose? A. No. Because I have seen the same stone in the shape of a cobble that was not decomposed. I have seen it partly decomposed; In fact this stone I picked up was only partially decomposed

Q. What kind of rock is there you know of, of that character?

A. I do not know the name of the rock; I am not familiar with the name of the rock

Q. Do you know there is any rock of that character?

A. Yes. I know it from seeing it, and from practical experience.

Q. Where have you seen it other than here? A. Saw it at the mine at Michigan Bar. I noticed it there first particularly.

Q. Was that a rock, being exposed to the air for a little while, slacked and fell to pieces?

A. That seemed to be the result.

Q. Was it a rock at all?

A. It was what I would call a rock?

A. It was what you would call a rock

A. Yes

Q. Where did you find that?

A. In the bottom of the mine

Q. Did it look as though it came from the sides there? Did you see anything like that in the sides of the mine or in the bottom of it?

A. Yes. I saw a similar rock in the sides.

Q. In the deep mine I mean now, not up above?

A. Yes; In the deep mine

Q. You saw that in the sides? A. Yes

Q. The same character?

A. The same character.

Q. A good deal of it?

A. No, not a great deal of it. My attention was called to it particularly because I had seen the same thing elsewhere

Q. Was it called to it by your own looking at it or by some body else?

A. By my own looking at it, simply because I had seen the same rock elsewhere.

Q. Did you call anyones else attention to it?

A. I do not think I did;

I might have done so but I have forgotten it.

Q. Did you find that in large quantity.

A. Comparitively speaking no

Q. Was it in a layer passing around the claim.

A. No

Q. Only a spot or spots?

A. It was intermingled with the other gravel and cobble.

Q. You speak of seeing quartz there. Did you see quartz in the mine

A. Yes

Q. Where did you see that? On the bottom or in the sides?

A. I saw quartz gravel in the gravel bed ~~sides~~ on the sides ~~gravel bed~~.

Q. In reach of the hand, so you could reach up and get it?

A. Yes

Q. Did you get it?

A. I do not think I took any from the sides. As I went up the trail I picked up several pieces; along on the side — yes

Q. From that down to the lower mine, in the deep portion of the mine, in any considerable quantity?

A. I did not pay any particular attention to the amount that was there.

Q. Do you know the difference between quartz and the other rock you found there?

A. From the appearance of it I do.

Q. What was the appearance of the quartz?

A. The quartz was whitish in color; sometimes with a blueish cast.

Q. Is there any slate there?

A. The bed rock had the appearance of being slate though I do not know that it is slate. It had that appearance.

Q. Did you find any sand stone.

A. I did not ~~find~~ notice ~~an~~ sand stone there.

Q. Is your acquaintance of

ock sufficient so that you would recognize sandstone, ~~gravel~~ quartz and granite?

A. In some of its forms I could; Perhaps not in all.

Q. Is there any granite there?

A. I noticed granite sand or rather mica sand. Mica presumable comes from granite

Q. Where did you find the mica sand?

A It dispersed with the gravel

Q. In the lower claim?

A. I noticed on the banks, on the sides.

Q. On the banks of what?

A. The sides of the claim, the gravel bank.

Q. On the gravel bank at the side of this pit?

A. Yes

Q. There you found sand containing mica? A. Yes

Q. Do you know whether mica is found in granite

A. I do not

Q. Do you know that it is

found in granite?

A. Yes

Q. Do you recognized mica readily? A. Yes

Q. By what? A. By its appearance.

Q. What is there peculiar about its appearance

A. It has a small scale, is lightish in color, is light in weight, and has a glistening appearance.

Q. That you say you found in the sides of the pit. Did you find it there in any considerable quantity?

A. I did not notice any large quantity of it — No

Q. Did you find any rock of that character.

A. Of the character of granite?

Q. Yes.

A. No I did not. No I did not notice any.

Q. Now on your plat I see what is marked as the levee, at the extreme right or near to that, looks like a tower. Did you mean to have that as a fair representation of that levee?

A. "The profile is made on a plat scale."

Q. What is the scale?

A. The horizontal scale is 40 feet to the inch; the vertical scale is four feet to the inch.

Q. That being graduated them in that way accounts for the heighth, the comparative height of the levee there? A. Yes.

Q. Do you know about the cut, the new cut there, through which American River passes now? Were you here at the time that was cut through?

A. I was not.

Q. You know nothing about that? A. No I do not.

Q. Farther than what you see of it now?

A. That is all. What I have seen on maps and what I have been told is all that I know about it.

Q. You spoke of some cultivation which you found there. One was a hop field and the other a potatoe patch. Do you know whether those were on soil which had been brought down by the river

A. It was a light loamy soil. I do not know where it came from. It presumably came down the river some time. It had the appearance of being a loamy deposit.

Q. Sand more or less in it?

A. There may have been some sand in it. There is more or less ~~all loam~~ sand in all loam I presume.

Q. Have you the high grade of the city marked upon your plat? A. No sir

Q. Can you put it there? A. No sir

Q. Why not? A. I have not the data

Q. Are you the City Surveyor? A No sir

Q. You are the County Surveyor A. Yes sir

Q. Do you know what the new grade as compared with the grade you have there? A No sir, I do not

Q. You took it from 24th street. Now you said that was an average level there. How did you average it?

A. From extending it back from the street

Q. How far? A The ground lays pretty level there, there is no difficulty in getting an average, it extends back about 100 feet

Q. Do you know whether the slope back beyond that is up or down? A I do not

Q. Then the level, and the only average level, which you took was 100 feet right by the levee, and running higher or lower back from that you do not know all? A No sir. there was not much variation in it it may fall or rise very little

Q That was on the original surface where you were?

A. That is the surface as it exists now, the original surface as far as I know

Q. Whether that be the original surface, that you know only from finding it in its present appearance?

A No sir, the part where I took it is planted to an orchard, trees have been growing there for a number of years,

Mr Cadwalader Whose orchard was that? A I do not know whose orchard it was? A I do not know whose orchard it was

Mr Belcher Was there anything

there to indicate from what place the material for this levee had been taken?

A There was some excavation on the north side of the levee

Q. That would be the river side? A The riverside of the levee - recent excavation. I did not take the level of that

Q. Was there any on the land side? A No sir

Q. No excavation there?

A. No sir, There was a ditch running right close to the levee, whether it had been dug there, or whether it was caused by filling the street immediately beyond I do not know. The ditch is shown on the profile

Q. What have you at the extreme left there? A At this point here, that is the north bank of the present channel the height of that is 9 4/10 feet above the base line

Q. Then from the map that you have drawn there, the distances horizontal and perpendicular, the one is ten times greater than the other?

A. Yes sir

Redirect Examination of Jim C Pierson

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Mr Hart. Where is that ditch that you spoke of?

A. The ditch is shown at this point (showing). It is immediately at the southern base of the levee

Q. How wide is the ditch?

A. It is not over 3 feet.

Q How deep? A. A foot and a half. well it is now two feet below the top of the road, as it is graded there

Q. What is the difference in height between the bottoms of that ditch, and the land on the other side of the road, the base line? A about 4/10 of a foot

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Q. Which is the highest?

A. The ground, the base line

Q. The base line is 2/10 of a foot the highest? A Yes sir

Q. The road that you spoke of as having been built up, how high is that built up?

A. That is nearly two feet above the base line, a foot and eight-tenths

Q. What kind of material is it constructed of?

A. A sand road, I has been put in there recently

Q. Now, going to the other side, what is the nature of the bank on the other side that you say is 9 feet higher than the base line?

A From where I saw it, it has the appearance of being loamy, the same as this bank here (referring.)

Q. Did you see at that bank any evidence of a deposit of sand and debris, like that which you find in the bed of the stream, the old bed of the stream.

Objected to on the ground that it is not re-direct examination. The Court sustained the objection, and plaintiff E 4 excepts.

Q. I will ask you about the character of the soil of the hop field, how it compares with the deposits in the old channel of the American River?

A The soil in the hop field, is a loamy soil, and the material in the old channel of the American River is clean washed sand

Q. Is there any respect in which they resemble ach other?

A. No sir

Q. How does this soil in the hop field correspond ~~with~~ in its general quality, with the lands generally about the City of Sacramento?

A. It is much the same quality. It has the appearance of being good soil

Mr Belcher Can you tell how deep the filling is in the hop field? A. No sir

Q. Can you tell how much of the soil in Sacramento is sediment brought down by the river? A No sir

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Testimony of G. F. Allardt

Called for Plaintiff Sworn

Mr Cadwalader What is your business? A. I am a Civil Engineer

Q. How long have you been one? A Twenty-eight years

Q. What particular branches of that business, if any have you devoted your special attention to? A. I have followed nearly all branches, railroading in my earlier life and surveying, and the latter 7 or 8 years I have paid more especial attention to matters appertaining to hydraulic engineering

Q. What is your business?

A. It is all included in civil engineering

Q. How long did you say you had been a civil engineer? A. About 28 years

Q. Did you make that map? (referring)? A. It was made under my directions, and a great deal by myself afterwards, added to it.

Q. What does it purport to be?

A. It is a map of the American River from Gold Run down to its mouth, showing the topography the towns, streams, roads and distances

Q. What is it constructed for?

A. It was compiled in the United States Surveyor Generals' Office from the public surveys, and some items from Doolittles' Map, and some from the map on file in the State Engineers' Office, the same map that has been submitted here

Q. Have you been over the line of that route in order to form an opinion as to its correctness or not from personal observation?

A. I have

Q. Does it agree with what is called the Doolittle Map, which has been introduced in evidence here? A It does, and it is probably more correct, being on a larger scale in many particulars, fully as correct I suppose. It is a good, correct, geographical map of the country

Q. What kind of attention have you paid to hydraulic engineering? A I have been engaged in water supplys, water-works, I was principal assistant in the water supply investigation made for the city of San Francisco in 1874 and 1875; and I am now engaged in the matter of water supplies; I have been connected with the Harbor Commissioners, and have been Chief Engineer of the Tide Land Surveys

Q. What have you seen of hydraulic mining in California? A. I have inspected all the principal hydraulic mines on the Yuba River, and its tributaries, on Bear River, on the Consumnes, the mines on Feather River, and mines on the American River at different times

Q. Have you inspected what are known as the mines of the Gold Run Ditch and Mining Company, the defendant in this case?

A. I have

Q. If so, when? A. The exact date (referring) in June of ~~each~~ this year

Q. Were the mines in operation at that time? A. They were

Q. What did you see there — first just indicate where those mines are situated on that map? A The defendants mines are on what is known as the Gold Run Ridge lying between the Central Pacific Railroad and Cañon Creek, near the town of Gold Run. They are represented on the map and marked as "Gold Run Hydraulic Mines." That represents the entire excavation in that district

Q. Where is the particular mine of the defendant - ~~one of~~ or the mines? A The mine that they were working at the time of my visit, one was at the southern extremit of this pit, what was known as Indiana Hill and another mine was at work in the northern extremity about a mile northeast of the mine of Gold Run. The first mentioned mine was about a mile southwest of the town of Gold Run

Q. Where were the tailings from the mines being discharged? A. They were discharged directly into Cañon Creek

Q. By what process were these mines being worked?

A. They were worked by what is known as the hydraulic process

Q. How much water was being used, and under what pressure, and by means of what instruments or appliances? A The upper mine at the northern extremity of the pit was worked by a giant, a large pipe know as a giant, they are sometimes called monitors, five-inch nozzle, and they were piping against a vertical bank of loose material which readily gave way to the action of the water, and the water and material piped together, ran in a ground sluice into a flume directly into Cañon Creek. At the other mine, at the southerly extremity, there were two such giants at work piping against the banks, one against new ground, and the other one in a lower portion against the bank, the top of which had been washed off. This water and material all ran by means of a number of ground sluices into a tunnel converging into a shaft, which enters the tunnel and through the tunnel, through a ridge, a distance of about 2200 feet into the cañon of Cañon Creek where it was discharged directly into Cañon Creek

Q. What was the shaft—a drop?

A. The shaft was a well, the ground sluices all converged towards this well

Q. Where was the well?

A The well was in the bottom of the large pit

Shaft 40 ft

in the lowest point, very nearly the lowest, so that the water would very freely run to it

Q. How deep is that well?

A. About 40 feet below the surface

Q. What did that drop into?

A. That dropped into the tunnel, and thence the water ran down through the tunnel

Q. How long is that tunnel?

A. Something over a quarter of a mile, if I can say what I was informed about the length, I did not measure it,

Q. How was it arranged?

A The Superintendent informed me it was 2200 feet long, and it had a fall of six inches to the box, ~~[illegible]~~ that is to say six inches to 12 feet, miners' phrase six inches to the box, that is a fall at the rate of 220 feet to the mile

Q. State how that is equipped?

A. It was lined in the

usual manner, the bottom was lined with railroad iron. They are often lined with blocks. I cannot say whether this had blocks under it or not. The usual miners' flume was catching the gold. Water ran through it with great velocity, a velocity of 8 miles per an hour, and dropped directly into Cañon Creek with a drop of about 30 feet, I think 30 feet, and then ran down the creek. The water from the upper mine, as I have stated, ran directly into Cañon creek without a tunnel and flowed Cañon Creek, down the natural channel of Cañon Creek for a mile or so, and mingled with the waters coming from this tunnel. From the tunnel down, both waters were mingled, and ran down the Cañon to the north fork

Q. What kind of material was being washed by this defendant at this ~~t~~ time?

A. It was material of various kinds, it was sand, gravel, and some small stone. I took a sample of the material that came out of the tunnel at the time

Q. How much water were they using?

A. The upper mine was using about 1100 inches of water, I measured that, but not all of that water was used for piping the banks. A part of it was used in dropping from the ~~end~~ top of the bank down, making a sort of waterfall, and adding to the volume of water, at the bottom of the bank, and aided in transporting it into the flume. The other mines were using about 800 inches — 800 inches that is about 1300 inches of water when I was there, as near as I could estimate it

Q. What kind of water were they using? A. The water was clear.

Q. How were these mines equipped? A. I should say they are equipped in a first class manner

Q. For night as well as day working? A. Yes sir I saw them work at night at one time when I was passing on the railroad subsequently, I saw they were equipped with gasoline lamps at the giant so that they could be worked at night. The water is brought to the mine in 3 sixteen inch pipes, very long pipes, maybe a mile long, three of them, but one of the pipes furnishes water for another mine that I have not mentioned, not belonging to this company

Q. What were the heights of the

banks that were being worked by this defendant?

A The height of the upper mine was about 40 or 50 feet and the lower point where the two monitors worked, one monitor as I stated, was working against an original bank which was perhaps 30 or 40 feet high, and the other was working lower down in a lower pit perhaps 100 feet high. The banks vary so much that you can't give any exact dimensions, sometimes 100' and some places more, very high indeed

Mr. Belcher. What was the heights given first?

A. The upper one about 40 feet

Q. And then there were two in the lower?

A Two in the lower. Perhaps I had better refer to my memorandums in that case. I suppose that will be permissible for figures. I cannot remember all these figures

The Court. Made by yourself at the time?

A. Yes sir made on the ground, no memoranda made afterward (referring). Bank fifty feet high. The first mentioned mine the northern mine, the bank 50 feet high mostly light material which continually caving as the water is applied. The size of the pit where they were at work was about four hundred feet in diameter. I also stated that in that mine 20 or 30 feet of the top layer had been washed off in previous years

Mr. W.C. Belcher. I asked you for a certain matter here. The first you say was 50 feet in the upper mine and then there were two heights given in the lower mine one of them was 100 feet what was the other — can you tell what answer you gave a little while since when you were asked the question by Mr. Cadwalader?

A. Guess. I think 40 feet

I spoke from memory then, 40 feet

Q. That is what I wanted to get at, what you had already stated

Mr. Cadwalader. State the nature of the material that was being washed first from the upper mine?

A. It was loose material that readily gave way to the action of the Giant; with water, sand, gravel — what is technically called gravel — a great deal of sand mixed with it and necessarily some clay because it stood, it was very firm and sand alone would not stand vertically; it was cemented with a sort of clay. The other banks were very much the same. This new bank in the Southern Mine, there was considerable red dirt on top, a layer of red dirt the usual depth three or four feet sometimes more, and under that was

was this homogeneous material looking very much alike, some stones in it, smaller stones not very large, it was not a cobble bank like some mines. Then in the lower pit I should call it gravel, though there was a rim of pipe clay, a layer of pipe clay on one side, on the eastern side that was perhaps ten or fifteen feet thick. They had worked into a certain distance and then stopped, I do not know how much

Q. Where did all this material so washed, go?

A. All went into Canon Creek

Q Do you know that of your own knowledge?

A. I do. I am positive it could not go any where else

Q. Why? A. Because it was the lowest point, it was in a basin and I saw it go in and I saw it come out, and it could not have gone any where

Else unless it was carted out

Q. Do you know any thing about the total Excavations in the Gold Run mines?

A. As I have frequently done in other mines, I made an estimate of the amount of material that had been taken out since the beginning of mining in that mine as well as others. I do not wish it to be considered at all accurate, it is an approximation and I endeavored not to exceed the amount of my estimate, and I make it about 38.000.000. cubic yards, It may be more than that but it is as much as that at any rate, in this one pit. This is a continuous pit two or three miles long, I guess it is nearer three miles long

Mr. Cadwalader. Where would all that stuff naturally have to go?

A. It must all go into Cañon Creek and thence into the North Fork of the American. The ridge divides it from Bear River and it could not go into Bear River —

Q. Describe the route that the material washed out of the defendants mine takes and how it travels from the mine down to the American River?

A. In the upper mine the material, the water and tailings ran down Canon Creek as I stated for about a mile and then joins this water coming out of the tunnel, then it descends rapidly with great velocity to the river. The descent is a little over a thousand feet in a distance of a little less than a mile

Q. You estimated the hight of the banks in the main mine on Indiana Hill at how much, the original banks now being worked? A. The original banks ~~have~~ can ~~been~~ be seen — that is to say, the depth of the lower workings, do you refer to?

Q. Yes sir

A. It is very irregular. I suppose no place less than one hundred feet. When I was there last I tried the barometer on it and in one place it was a little over one hundred feet, and that was not the deepest place

Q. What is the hight of the highest wall from the bottom of the pit?

A. The pit extends to the town of Gold Run. The elevation of Gold Run is 3200 feet above tide, 3200 feet above the level of the sea and this lowest pit by the barometer is 2800 feet, that would make a diffrence of 400 feet of elevation between the town of Gold Run and this lower pit, though the banks are not quite as high as that, probably 300 feet, the extreme hight of the banks all added together might be 300 feet

Q. What is the rate of Canon Creek below the mouth of the tunnel and the condition of the bed of Canon Creek above and below the mouth of the tunnel?

A. Above the mouth of the tunnel from the point where the North mine tailed into the creek it is an even grade of 30 or 40 feet to the mile perhaps very much filled up with tailings old and new. I made an estimate of the amount which I think remains there. I make it about a half a million of yards of tailings still remaining there

Mr W C Belcher Where is this?

A. Between the mouth of the tunnel and upper mine or the head of the mine

Q. That is Cañon Creek?

A Yessir, from the mouth of the tunnel down there are practically no tailings whatever; it was swept clean. There is a little place of a few thousand yards, a little pocket. Just above that there was an under current which was about a quarter of a mile below the mouth of the tunnel that arrests a small quantity, perhaps a few thousand yards, and below that it is swept entirely clean

Q. What kind of water was running in Canon Creek above the mouth of the tunnel?

A. About one hundred inches of clear water above the upper mine

Q. Did you make an Estimate of the amount of earth that was passing through the tunnel down Canon Creek and into the American River?

A. I did

Q. From this mine?

A. I did, by means of taking a sample of the water and afterwards ascertaining the percentage of solid material in it

Q. Have you got a sample of the water? A. I have

Q. Just produce it will you

A. (witness producing sample) This sample was taken from the mouth of the tunnel when they were at work. I took a sample three or four times so as to get what I thought was a proper average. It is in a black bottle and I will have to show it in a tube so that it will be visible. The bottle is marked "[illegible] flume in "front of Gold Run tunnel "Cañon Creek - taken June 18th/81 "at 1 P.M" (witness fills a "glass tube with water from "the exhibit)

Q. What is the stuff in it?

A. That is the stuff that came out of those mines while they were at work. It is not even the full extent because it was dipped from the top of the flume, it was dipped with a dipper from the top of the water, and there are bowlders at the bottom

Q. What proportion of that matter is solid matter, of

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that material?

A. Eighteen per cent in volume.

Q. How much in weight?

A. I did not calculate the weight. I thought the volume was all that was necessary

Q Did you make an estimate as to the amount of solid matter that there was passing from this mine into the American River ~~often~~ Cañon Creek

A. I did

Q For a miners inch?

A. The estimate was made in this manner; It is probably a very correct estimate at the time they were working

Q. Just state the manner of the estimate

A. A miners inch of twenty four hours is 2230 cubic feet of water. In other words a miners inch running for 24 hours would fill a tank 15 feet square and 10 feet high, a tank as large as an ordinary sized room. One

3400 inch reduced to cubic yards

It is about 82 but I prefer to use round number, 80 cubic yards. Now 18 per cent of 80 is 14.4. Showing that there are 14.4 yards of solid material to every miners inch of this sample of water, the water that was running through that tunnel at that time. Now I estimate that there were 800 inches flowing through the tunnel. That multiplied by 14 is 11,200 cubic yards. This came from the lower mine. The upper mine as I say was using about 1100 inches of water but not with that force that the lower mine was, and I suppose would add about 2000 yards to it making in all about 13,000 yards providing they worked 24 hours

Q. That is ~~that~~ with the water you say these 13,000 yards taken from the bank were being passed into the American river?

A. Torn from the banks and deposited into the North Fork of the American River

Q. Did you go to the junction of the Cañon Creek with the American River?

A. I did twice

Q. Describe the appearance of the American river immediately above the junction?

A. When I was there at the time the mine was working it is a very precipitous Cañon and it took some time to go down there. I went down there and found a large body of water flowing into American river, as clear as the mountain streams

Q. About how much water flowing there?

A. There was about 11 000 or 12000 inches of water flowing in the river above

Q. How far up the river could you see?

A. I could see up perhaps a quarter of a mile and

I had been previously up the river about five miles to Green Valley. I had seen the river in several places

Q. What effect did this flow of water in Canyon Creek have upon the American River?

A. That very soon mingled with it and produced a muddy stream, a very unsightly muddy stream of course, and went down stream

Q How muddy — how much sedimentary matter?

A. I took another sample of water about six miles below at the Stevens Suspension Bridge about at that time

Q. Point it out on the map.

A. Here is the tunnel, there is Canon Creek, there is the junction of Canon Creek and the North Fork of the American River marked an elevation 1711 feet above the sea Stevens Bridge is at a distance

3403 of six and a half miles

below the mouth of Cañon Creek. That is a pack trail bridge, a suspension bridge and I took a sample of the water there and analyzed it in the same manner and found it to contain three per cent by volume of solid matter. There is a link that I want to connect there. I took another sample at the mouth of Cañon Creek, which contained the water coming through the tunnel and also the water coming from the upper and North mine and found that the percentage was less which was to be expected as the North mine was not so fully charged. I found the percentage there to be 14 per cent. then after the water had commingled with the clear water of the American with about 5 times the amount of water, 5 times the volume, the sample taken six miles below was found to contain 3 per cent., rather a satisfactory result, it naturally would be about 1/5 as much charged, being mixed with four or five times the same amount of water

Q. One result verified the other did it? A It did very satisfactorily as far as things can be — I was satisfied with the result as being very nearly correct

Q. Well now describe the original topography of the country in juxtaposition with the Gold Run ~~ditch~~ mines?

A The ground not washed away, the original topography are rounded hills smooth or steep and covered with a growth of pine trees some feet in diameter, some of them very large old trees may be one hundred years old or more, indicating that there had been no change in the surface, where the miners had not been at work

It was in its original condition like all the mountains in that neighborhood

Q. Where did you go after getting down the river as far as Stevens Bridge?

A. My visit to Stevens bridge was in June. I went down on the trail to Stevens bridge at that time

Q. What do you mean by the trail? A. The trail from Colfax at that time but since then I have explored the river from Gold Run down to the Sacramento and passed Stevens Bridge again; that was in November - last month.

Q. When did you go to the Gold Run Mine again — let me ask you did you find any thing that could have polluted the water between where you took the sample, six miles below the mouth of Canon Creek and this Stevens Bridge where you took the samples.

A. No. There are no other mines working there. The Iowa Hill Mines were not working at that time. Part of them turned tail into the North Fork. I started on this last exploration October 30th.

Q. Where did you go first?

A. I took a wagon and was taken to Folsom on Sunday. On that day in company with Mr Huntly I examined the river in that neighborhood, and the next day we took horses and explored the river going up. Then we entered the river bed

Mr W C Belcher. You explored the river from Folsom where?

A. We went up the banks of the river keeping within sight of the river in such manner as to be able to see the whole river and explored the river partly in the bed and partly on the banks all the way up to Gold Run. I can give the exact route travelled if it is necessary

Mr Cadwalader Q. Did you go to the Gold Run mines? A. I did again, yes sir

Q. Did you see Mr. Jones there? A. Yes sir I did

Q. What time did you arrive there? A. In the evening of November 3d of this year

Q. Was the mine of the defendant in operation then? A. No sir, nothing going on

Q. Why was it not?

A. Mr Jones said they had been enjoined and he had not worked since the injunction

The above answer objected to by defendants, and the objection sustained and the answer stricken out

The Witness. They were not at work

Q. The mine was not in operation? A. No sir.

Q. Did you observe the mine then? A. Yes sir

~~Q. By means of what~~

Q. What condition is was in

A. It was very similar to the condition when I saw it in June only they were not piping nobody seemed to be at work there, everything was in place, the appliances were all there, ready for throwing the water upon the banks.

Q. Was any earth down ready for washing

Objected to as immaterial

A. The mine was very clean

The Court. Let him tell what he saw there (to witness) Tell what you saw in the mine

A. I saw the three supply pipes as before and at the end of those pipes were monitors and two of them I saw connected with the pipe and pointed toward the banks.

Mr. Cadwalader. Any signs of the mines being abandoned?

A. That was about all there was to see there at this time

Q. Now I will ask you who went with you on your trip from Sacramento to Gold Run in November?

A. Mr D. B. Huntly accompanied me

Q. Now did you examine the river from Canon Creek or have you examined the river from Canon Creek down to Sacramento since that time. If so, state the manner of doing it and what you saw and your manner of exploration and whom you were with?

A. I would inquire whether I should give my route of travel, or begin at the upper end and travel down as the results of my investigation. Perhaps it would be clearer that way to describe what I saw commencing at the upper end

Q. Yes sir, using your notes to any extent you desire or doing without them as you please?

A. I can refer to the map I presume — I must point to the map.

A. Yes sir explain it by the map.

A. The American River from Gold Run to Sacramento ~~was~~ is divided up into miles shown by red figures. In order to more easily designate the points on the map I also give the approximate length of the river. From the mouth of Canon Creek we rode in the bed of the river.

Q. I want to ask you whether you found any deposit there

A. None

Q Well now go on.

A When I say none I want it understood none worth mentioning. It was clear ~~[illegible]~~ ~~worth~~ off deposits for a half a mile below the mouth of the Creek. After that deposits appeared say at Ross Bridge there was a bar of deposit there estimated at 12000 cubic yards. In the third miles there were two bars 19000 cubic yards and 6000 cubic yards, the filling estimated at 15 feet

R R grade

Q. Describe the character of the water or current as you go down, as much after the manner of Grunsky as is convenient for you

A. The current of the water seemed to be very uniform in all this distance I will described now between here and the first nine miles of the river; a uniform currant about 40 or 50 feet wide, meandering from one side to the other of the river bed. The river bed itself was almost level and filled to a uniform grade, ~~from~~ a ~~the~~ rail road ~~bridge~~ grade as you may say, all the way down, the water running off a foot, a foot and a half or two feet deeper than the general surface of the bed. In going down I took notes of the width of the river, the debth of filling and the distance traveled. From time to time I measured the width of the river to correct

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my estimates; and when I returned to San Francisco with all these notes — I speak of notes all the way down — I made the computations as to the quantities and they are now put on this map. My object was to find how much debris had lodged in the river; a subject that is fraught with some difficulty, so we cannot ~~no~~ be very exact but ~~he~~ we can approximate.

Q. State your manner ~~at~~ of arriving at the extent of each deposit and describe the nature of such deposits

A. These bars that I saw seemed to be in this first 10 miles of the same nature. There was sand, small stones, and some cobble. When the water came next to them they easily gave way and caved down. The bed of the river generally very hard. Like a cobble pavement; no difficulty in riding in it, though there was a great many soft places which were filled with slickens which it was necessary to avoid in order to prevent being mired. Those places were small comparatively in that reach of the river. As I was saying, the fourth mile — I am now giving the bars — the debtt depth of the river.

Q. (Intg) Does that all appear on the map?

A. That is shown on the map. The estimated contents of these bars. The width of the river is also shown on the map at different places.

Q. How did you arrive at the filling, the deposit?

A. I arrived at it by knowing the general height of high water, That is, where there is no filling — I estimated the high water mark — how high the river would rise. Where there was filling I resorted to and I observed the appearance of the water worn rocks. Whence they merely ~~caught~~ cropped out above the surface I assumed that the filling was filled up as high as the high water mark in the river, as the high water mark would fill the river

Q: How is that?

A: It was necessary to establish some system in ascertaining the depth of filling. Of course we could not dig for it! That was out of the question. Now for instance, high water mark at the mouth of Canyon creek, say, was 20 or 25 feet high; twenty five feet above the present bed of the river which was washed clean. That would be a guide in that reach of the river as to how high a freshet would reach. Now when these water worn rocks disappeared under the debris it of course followed that the river had filled up to that extent. Where the cropped out a certain distance —say ten feet, the filling ~~out~~ only reached within ten feet of the carrying capacity of the river,— of the high water mark of the river. Now in the Canyons it is very plain to be seen where the ordinary freshets reached— how far they reached— by the smoothness of the rocks that were worn. On that basis I made notes as I rode along, as to the amount of filling at the different points. That is the basis of computation.

Q. Was this the first river that you ever examined in that way? A. It was not. I have surveyed the Yuba river from one end to the other and the different forks, with the same object, of ascertaining the amount of debris lodged in it for 60 miles I think of survey I made.

Q. Now coming on down

stream until you get to what was called Iowa Hill dumps?

A. We have passed those already I think.

Q. What are they dumps of?

A. There are no dumps there now. They are gulches coming down a steep mountain, showing where the material from the Iowa Hill mines had reached the river. But they were not working at this time. There was no water running down.

Q. Did you find much of that material in the river where they dumped?

A. Very little. Small dumps

Q. Give us the estimate of the fills there, according to the sections, so that it can be taken down?

A. I have made out from all these notes an estimate of the entire amount of filling in the entire North fork, which I have in tabular form which was the result of this kind of an examination

(Reads) Approximate estimate of the amount of mining debris

+ lodged in the ~~South~~ North fork of +

the American River from the Gold run Hydraulic mines to its junction with the Middle fork of the American River, a total length of twenty eight and a half miles)

Mr Belcher. How much?

A. twenty eight and a half miles, measured along the river. (For the first half mile clear of debris) Shall I read it?

Mr Cadwalader: Yes

A. (Half a mile to two miles— that is to say, ~~half~~ from the half mile point to the two mile point; thence one and a half miles. Average width, 25 feet; average depth 7½ feet; contents in cubic yards, ~~27~~ two hundred and seventy five thousand; three bars, thirty seven thousand cubic yards. Now in the third mile —

Mr Hart (Intg) Is that for each mile.

A. It is for every mile that I have given it here, or every section you might say. There are mile sections. Third mile; average width 165 feet; depth 14 feet; contents 451.700 cubic yards. Fourth mile; width 165 feet depth 16 feet; contents 576.000 cubic yards. Fifth mile; 165 feet wide; 18 feet deep; contents 580 800 cubic yards. Sixth mile; 160 feet wide; 16 feet deep; contents 500 600 cubic yards. Seventh miles; 170 wide; 15 feet deep; contents 498 700 cubic yards. Eighth mile; 180 feet wide; 17 feet deep; contents 598400 cubic yard; three bars, 18000 cubic yards. Ninth mile 200 feet wide; 10 deep; contents 391 100 cubic yards. The ninth to the twelfth — 3 miles in length — clear of debris; nothing; thirteenth mile; 120 feet wide; 5 feet deep contents 117.300

cubic yards. Fourteenth mile; 110 feet wide; 13 feet deep; contents 279600 cubic yards. Fifteenth mile; 140 feet wide; 15 feet deep; 410600 cubic yards. Sixteenth mile; 150 feet wide; 15 feet deep; contents 440,000 cubic yards. Seventeenth mile; 150 feet wide; ten feet deep contents 293300 cubic yards. Eighteenth mile; 100 feet wide; 10 feet deep contents; 195600 cubic yards. Nineteenth mile; 250 feet wide; ten feet deep; contents 488900 cubic yards. That was my detailed examination of the amount of debris in the river. Below that, having seen the river ~~below~~ before and inspected it, I had found that it was not filled up so much as above, but I estimated the fill to be equal, the same as above.

Q. Down to what point?

A. Down to the mouth of the North fork.

Q. The middle fork—

A. Down to the middle fork—yes. That is nine and a half miles.

Mr Hart. He is going on the North fork.

Witness To the junction with the middle fork—nine and a half mile. That is an estimate base upon the other nineteen and a half miles which I inspected carefully, and as I say, I assumed to be filled up in an equal degree, though I do not think it was by a considerable. The average of the other 19 miles was 320 000 cubic yards per mile. Nine and a half miles would make three million and forty thousand cubic yard

Mr Cadwalader What is the total.

A. There is a Chinese dam; I estimated there was 15000 cubic yards accumulated there; making a total of 9207600 cubic yards.

Q. How does that agree with

Gunsky's computation?

A. I have not compared it with Gunsky. I understand it is very near about approximates his.

Q. What was this material in the river bed?

A. It was mining debris undoubtedly; debris from the mines. It is material that cannot be mistaken hardly.

A. What Kind?

A. Sand, small stones, some slickens, gravel, and some cobbles.

Q. Which Predominated? What proportion would the sand bear to the rocks?

A. I should say it was perhaps half sand; perhaps half sand and the other half stones. It is hard to tell exactly. It varies a good deal

Q. What was the size of the cobbles as a general thing

A. There were a very few cobbles as large as your head, 3422 very few. I think those came from the bank mining. There were a few bank mines but they were small.

Q. What is the nature of the country from

A. The nature of the country is extremely percipitous, so that it is almost impossible for one to go along there except there is a road or path.

Q. Where did you travel?

A. We traveled in the bed of the stream; that is to the point I mentioned.

Q. Who was with you?

A. First Grunsky, and General Cosby was with us one day. The rest of the time Huntley was with me. ~~the rest of time~~

Q. What kind of water was running in the stream?

A. The water was very nearly clear. I have a sample of the water here.

Q. Will you produce it?

A. Yes. I had better bring my satchel here (produces bottle). This is it: (Taken from the north fork of the American just above middle fork November 2d.) Water there is fit to drink

The Court: When taken?

A. November second.

Q. At what point?

A. Just above the junction of the middle fork, 28½ miles from Canyon Creek

Mr Belcher Do you offer that as an exhibit Mr Cadwalader?

Mr Cadwalader Yes. What were the banks of this stream? Hard or soft?

A. Of the north fork?

Q. Yes. And middle fork.

A. They are rocky banks, rocky slopes, sloping from 30 to 45 degrees, and in many cases 45 degrees, and in many case covered with brush and trees

Mr. Belcher I did not hear the last sentence?

A. In many places covered with brush and trees; Generally cover with brush and trees, quite impenetrable for passage

Mr Cadwalader You spoke of three per cent of sediment being the water of the river six miles below Canyon creek when you were there in June?

A. Yes.

Q. Is that a large or small quantity of sediment for a river to carry?

A. That is a very ~~Excessive~~? unusual ~~universal~~ quantity of sediment for any river to carry

Q. What amnt? kind of sediment does the Mississippi carry

A. The average according to experiments made by the United States Government under Humphreys and Abbott, is about one twenty ninth of one per cent. I think the heaviest is reported at one eleventh of one per cent. The average the year round is one twenty ninth per cent by volume while the ~~max imum~~ minimum is about one six thousandth of one per cent. Dont put that down

until I see if it is right.
(Examines notes and corrects brackets) No; the minimum is one one hundred and twentyonth of one per cent; That is almost clear water; it is clear water.

Mr Belcher That would be one in 12000 one hundredths?

A. One part in 12000 one hundred parts.

Mr Cadwalader down to the mouth of the middle fork did you find any obstruction at all to the flow of the mining debris coming out of Canyon Creek?

A. There is none whatever. There is what is known as the Chinese dam but that was broken and the water was flowing very freely through it. That is a little temporary dam perhaps 4 or 5 or 6 feet high made of gravel and earth

Q. What is the grade of the river? A. I think in that reach about 30 feet to the mile.

Q. What is the velocity of the water? A. I measured the velocity in a few instances, and then from that as a standard I estimated as I went along. I think it averaged about 3 miles an hour, sometimes 2 miles an hour. But it was a very uniform velocity.

Q. Was this at the lower stage? A. Yes. We forded it a great many times with our horses and it always seemed to be about the same depth; about a foot in depth. It averaged about a foot in depth.

Q. What do you say as to the correctness of your measurements and your distances across the stream between the banks?

A. I won't say they are correct but they are a good approximation. The river is very uniform in ~~all~~ its entire course. It is like a canal. It is not difficult to get an average.

Q. Any holes in it that are not filled? A. None whatever. I saw none. It is a smooth bed.

Q. What is the distance from high to low water mark on that section of the river? A. It varies, ~~but it~~ Where the river is narrow the water mark is higher, of course. I think 20 feet, 20 to 25 feet, would be a fair average ~~toward~~ in an ordinary flood.

Q. What would be the velocity of its maximum heighth. A. ~~at~~ as the heighth of the velocity of a stream varies approximately as the square root of the depth. Now for instance, if we take the stream in any one locality and, having its depth and velocity, if we assume that depth is increased it is a simple calculation to ascertain it velocity. For instance, if the ~~be~~ depth is one foot, as it was generally, and the velocity three miles an hour, if the depth was increased to 20 feet the velocity would be increased to four and a half times, four and a half being the square root of twenty. That is to say, if at low water the velocity of the current is ~~2~~ 3 miles an hour at high water the current might be, would be probably 13½ miles an hour. If the current is two miles an hour the velocity would be nine miles an hour, and so on

The Court here took a recess until Saturday morning Dec 3d 1881 at 9.30 a.m